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Clever Kids: A Metacognitive and Reciprocal Teaching Program to Improve Both Word Identification and Comprehension for Upper Primary Readers Experiencing Difficulty

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CLEVER KIDS: *A metacognitive and reciprocal teaching program to improve both word identification and comprehension for upper primary readers experiencing difficulty*

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Abstract

This study assessed the effectiveness of a metacognitive and reciprocal teaching approach for improving the word identification and reading comprehension skills of upper primary readers experiencing difficulty in a regular classroom situation. To improve word identification skills, subjects in the main training condition were given metacognitive training in the analysis and monitoring of word identification strategies. Reciprocal teaching procedures, incorporating the above word identification strategies, were used for comprehension training.

Subjects in the main training condition received the combined metacognitive word identification and reciprocal teaching program (n=25). Subjects in two other conditions received either traditional classroom word identification and comprehension activities (n=27) or reciprocal teaching of comprehension combined with traditional methods for identifying unfamiliar words (n=22). Measures of improvements in word identification, metacognitive awareneness of word identification strategies, and comprehension were taken on several occasions during the study, which took place over an 8 month period in a school year.

Results indicated that a combination of metacognitive word identification strategies and reciprocal teaching for comprehension was clearly more effective than traditional classroom word identification and comprehension activities or reciprocal teaching for comprehension with traditional methods of word identification. Results also indicated that a classroom-based model of implementation appears to be more successful when teachers (not researchers) have responsibility for its implementation. The implications of these findings for classroom practice are discussed, along with the limitations of the study and suggestions for further research.

ABOUT THE AUTHORS

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Dr Bruce is currently senior lecturer and course coordinator for the Faculty of Education at Avondale College. Previous teaching experience includes 19 years in primary schools in Australia and New Zealand, as well as 4 years at the secondary and tertiary levels in Papua New Guinea. Her research interests include reading disability, special education, and metacognition.

Associate Professor Greg Robinson, PhD

Dr Robinson works at the Special Education Centre, University of Newcastle. He coordinates the Master of Special Education course and is also coordinator of a diagnostic clinic for children and adults with learning disabilities. He was originally a teacher and a school psychologist and has researched, published and presented extensively in the area of learning disabilities and literacy problems.

INTRODUCTION

Australian surveys suggest that somewhere between 10% and 20% of primary school children have significant and persistent problems in learning to read (House of Representative Standing Committee on Employment, Education and Training, 1992; Masters & Foster, 1997; Rohl & Milton, 2002). Research indicates that for the majority of these readers experiencing difficulty the basic source of their difficulty is failure to develop accurate and efficient (i.e., automatic) word recognition skills (Samuels, 1999; Stanovich, 1992). In particular, readers experiencing difficulty in the upper primary school (the subjects of this study) are likely to be slow and inaccurate in decoding long, multi-syllabic words, and to rely on context to compensate for their decoding deficiencies (Spear-Swerling & Sternberg, 1994; Stanovich, 1992). 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; Yeu & Goetz, 1994). They are also likely to manifest difficulties with transfer and generalisation of learned strategies for decoding words (Moats & Foorman, 1997).

METACOGNITION

The consequences of reading failure at the word recognition and comprehension levels suggest a poor prognosis, especially after a number of years of failure (Stanovich, 1992; Waring, Prior, Sansom, & Smart, 1996). There are, however, positive implications for educational practice,

particularly in the area of metacognitive functioning, which involves awareness, self-regulation and monitoring of appropriate strategies for identifying or decoding unfamiliar words (Lovett, Lacerenza & Borden, 2000; Spedding & Chan, 1993, 1994). In particular, research by 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. Readers experiencing difficulty of this age group were found to be inferior in metacognitive abilities involving the use of orthographic cues, morphological cues and context cues. Readers experiencing difficulty were less strategic than average readers in using these cues and were often unaware of the strategies they did use. This would suggest that a training program for upper primary readers experiencing difficulty should include metacognitive instruction in the strategic and flexible use of a variety of word identification cues. While metacognitive research (both laboratory and classroom-based) has provided valuable insights into effective methods for improving the comprehension of readers experiencing difficulty (Bruce & Chan, 1991; Palincsar & Brown, 1984; Swanson & De La Paz, 1998), there has been little parallel research into metacognitive approaches to teaching word identification skills to children with reading problems (Calfee & Drum, 1986; 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). An effective instructional program for readers experiencing difficulty may thus need to include metacognitive training in appropriate strategies for identifying or decoding unfamiliar words, as well as use of metacognitive strategies for developing comprehension skills.

RECIPROCAL TEACHING

Reciprocal teaching has been characterised as "a dialogue between teachers and students for the purpose of jointly constructing the meaning of text" (Palincsar, 1986, 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, 1987; Palincsar & Brown, 1984, 1986).

A growing body of research has confirmed the effectiveness of reciprocal teaching techniques for improving reading comprehension (Bruce & Chan, 1991; Kelly, Moore & Tuck, 1994; Lederer, 2000). Reciprocal teaching has also proven 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 (Palincsar, 1987). 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, DePinto, Craig & Gardner, 1993; Palincsar, 1987; Speece, MacDonald, Kilsheimer & Krist, 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, 1984), and thus may not be entirely effective for the many readers experiencing difficulty who have inadequate word attack skills (Kligner & Vaughn, 1996; Moore, 1988). An effective instructional program for upper primary readers experiencing difficulty 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.

One method for improving word recognition suggested by Moore (1988) could be the teaching of word identification strategies through reciprocal teaching. Reciprocal teaching can be readily adapted to accommodate additional strategies and purposes, as indicated above. It may be possible to use the reciprocal teaching format to help students learn strategies for identifying unfamiliar words as part of a program involving reciprocal teaching procedures for improving reading comprehension.

PURPOSE OF THIS STUDY

While a literature search revealed numerous training programs targeting word identification strategies (Algozzine, Lockavith & Audette, 1997; Gunning, 1995; Shany & Biemiller, 1995), relatively few appeared to employ a metacognitive approach for training students in the thoughtful and flexible use of these strategies. Of those metacognitive programs that were found (Allen, 1998; Gaskins, Ehri, Cress, O'Hara & Donnelly, 1996-1997; Lovett, Lacerenza & Borden, 2000), none specifically targeted the upper primary age group in the regular classroom (students 9 yrs to 12 yrs), who were investigated in this study.

This study also sought to investigate a number of issues related to the implementation of a metacognitive training program, which arose out of a previous study (Bruce & Robinson, 2000). In this study, a program was set up for readers experiencing difficulties in the classroom and then gradually responsibility for implementation of the program was ceded to the class teachers. This model was found to be less successful in the teacher implemented phases as the teachers apparently did not develop a feeling of ownership of the program. In the present study, teachers were provided with a detailed guide for teaching and the strategies were explained and modelled for them over a period of two weeks prior to the commencement for the program. They were then asked to implement the program as it best suited their regular classroom structure. Regular monitoring by the researcher occurred to ensure that the strategies were correctly followed.

In a previous study (Bruce & Robinson, 2000), effective methods for implementing a metacognitive approach to teaching word identification and reading comprehension in the regular classroom were assessed. The study included upper primary readers experiencing difficulties in the training process, as well as normally-achieving readers, as it was felt that a combination of group support, shared expertise and the role models which they provided in the reciprocal teaching dialogue, would facilitate the use of these strategies in readers experiencing difficulties (Palincsar, David, Winn & Stevens, 1991). It was observed, however, that the readers experiencing difficulty were often overshadowed by their more dominant normally-achieving peers and therefore had less opportunity for participation in the interactive

dialogue. As a consequence, in the present study only readers experiencing difficulty were involved in the teaching sessions.

It had also been observed in the previous study that many students lost interest after several weeks of metacognitive word identification activities and it was not until the reciprocal teaching of comprehension phase was introduced that their interest was reactivated. For this reason it was decided to introduce reciprocal teaching of comprehension skills in a modified form in the first teaching phase, along with initial instruction in metacognitive word identification strategies.

The general purpose of this research was therefore two-fold: (1) to design and examine the effectiveness of a metacognitive training program, based on reciprocal teaching procedures which used an interactive, scaffolding instructional approach for improving the word identification and reading comprehension strategies of upper primary students with reading difficulties; and (2) to explore effective and efficient ways of implementing a program of this kind in the classroom setting.

With regard to the first general research question, the effectiveness of the proposed metacognitive program, the study focused on the following three specific questions: (1) To what extent will a metacognitive word identification program improve the metacognitive abilities in word identification of a group of upper primary students experiencing difficulties with reading?; (2) How does the effectiveness of a metacognitive approach to teaching word identification strategies compare with the effectiveness of a traditional approach to identifying unfamiliar words (i.e., supplying and pronouncing the word, as well as discussing meaning), for the target group?; and (3) How does a program involving a metacognitive approach to teaching word identification strategies and reciprocal teaching of comprehension strategies, compare with a program focusing only on reciprocal teaching of comprehension strategies and using the traditional approach to identifying unfamiliar words?

With regard to the second general purpose of the study, exploring the best method for training and supporting regular class teachers to implement such a metacognitive training program for readers experiencing difficulty in a regular classroom setting, this study focussed on three issues: (1) To assess the effectiveness of a model in which teachers assumed responsibility for instruction from the beginning of the study; (2) To examine the effects of class teacher training of only the readers experiencing difficulty in the classroom; and (3) To assess methods of creating interest in the metacognitive word identification segment of the program.

There were three training conditions in this study (*see Figure 1*). **Condition One** mainly addressed metacognitive teaching of word identification within a reciprocal teaching format. In phase one the emphasis was on metacognitive word identification strategies as fully described in the outline of the training program. This metacognitive word identification training occurred for 30 minutes a day, two days a week, with the third day being spent on modified reciprocal teaching of comprehension strategies for 30 minutes. The reciprocal teaching of comprehension involved asking questions and making a summary of the passage. During the second and third training phases, teachers concentrated on reciprocal teaching of comprehension strategies while still incorporating the metacognitive word identification strategies. The second training phase involved 3 x 30 minute sessions per week over 3 days, with the third phase being 2 x 30 minutes per week over 2 days. It would be expected that the metacognitive teaching of word identification would have a significant effect on word identification, awareness of metacognitive strategies and on comprehension in phases two and three.

Condition Two more specifically addressed the reciprocal teaching of comprehension. Teachers in Condition Two used traditional methods for identifying unfamiliar words (ie, supplying and pronouncing a word, as well as discussing meaning) and traditional comprehension lessons (i.e. worksheet-based comprehension) in phase one, changing to reciprocal teaching of comprehension strategies along with traditional methods of identifying unfamiliar words in phases two and three. The number and duration of training sessions in each phase was the same as in Condition One. While this condition would be expected to improve comprehension, the traditional methods of comprehension instruction in phase one and traditional methods of word identification in phases two and three could limit improvement in both word identification and comprehension.

Teachers in **Condition Three** used reciprocal teaching of comprehension strategies along with traditional methods for identifying unfamiliar words throughout each phase of the study, with the number and duration of training sessions being the same as Conditions One and Two. It was expected that comprehension would improve, but traditional methods of word identification would limit the degree of improvement. In phase one, however, the reciprocal teaching of comprehension may lead to greater gains in reading comprehension than the traditional comprehension lessons used in phase one of Condition Two.

METHOD

Subjects

The subjects were 74 readers experiencing difficulty selected from 14 Year 5 and Year 6 classes in five public schools located in areas of mixed middle and low socio-economic status in a semi-urban district of NSW, Australia. The students ranged in age from 9 years, 7 months to 12 years. Readers experiencing difficulty were defined as those having a discrepancy of 18 months or more between their chronological ages and their word recognition reading ages, as measured by the St Lucia graded word reading test (Andrews, 1973). Students who met the discrepancy criterion, but who had an identified intellectual or sensory disability, or whose reading deficit was due to learning English as a second language, were excluded from the sample.

In asking teachers to cater for only their readers experiencing difficulty, they were given the choice

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dialogue. As a consequence, in the present study only readers experiencing difficulty were involved in the teaching sessions.

It had also been observed in the previous study that many students lost interest after several weeks of metacognitive word identification activities and it was not until the reciprocal teaching of comprehension phase was introduced that their interest was reactivated. For this reason it was decided to introduce reciprocal teaching of comprehension skills in a modified form in the first teaching phase, along with initial instruction in metacognitive word identification strategies.

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With regard to the second general purpose of the study, exploring the best method for training and supporting regular class teachers to implement such a metacognitive training program for readers experiencing difficulty in a regular classroom setting, this study focussed on three issues: (1) To assess the effectiveness of a model in which teachers assumed responsibility for instruction from the beginning of the study; (2) To examine the effects of class teacher training of only the readers experiencing difficulty in the classroom; and (3) To assess methods of creating interest in the metacognitive word identification segment of the program.

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Condition Two more specifically addressed the reciprocal teaching of comprehension. Teachers in Condition Two used traditional methods for identifying unfamiliar words (ie, supplying and pronouncing a word, as well as discussing meaning) and traditional comprehension lessons (i.e. worksheet-based comprehension) in phase one, changing to reciprocal teaching of comprehension strategies along with traditional methods of identifying unfamiliar words in phases two and three. The number and duration of training sessions in each phase was the same as in Condition One. While this condition would be expected to improve comprehension, the traditional methods of comprehension instruction in phase one and traditional methods of word identification in phases two and three could limit improvement in both word identification and comprehension.

Teachers in **Condition Three** used reciprocal teaching of comprehension strategies along with traditional methods for identifying unfamiliar words throughout each phase of the study, with the number and duration of training sessions being the same as Conditions One and Two. It was expected that comprehension would improve, but traditional methods of word identification would limit the degree of improvement. In phase one, however, the reciprocal teaching of comprehension may lead to greater gains in reading comprehension than the traditional comprehension lessons used in phase one of Condition Two.

METHOD

Subjects

The subjects were 74 readers experiencing difficulty selected from 14 Year 5 and Year 6 classes in five public schools located in areas of mixed middle and low socio-economic status in a semi-urban district of NSW, Australia. The students ranged in age from 9 years, 7 months to 12 years. Readers experiencing difficulty were defined as those having a discrepancy of 18 months or more between their chronological ages and their word recognition reading ages, as measured by the St Lucia graded word reading test (Andrews, 1973). Students who met the discrepancy criterion, but who had an identified intellectual or sensory disability, or whose reading deficit was due to learning English as a second language, were excluded from the sample.

In asking teachers to cater for only their readers experiencing difficulty, they were given the choice

Table 1: Descriptive Statistics of the Subjects in the Three Experimental Conditions

	CONDITION 1 (N=25)	CONDITION 2 (N=27)	CONDITION 3 (N=22)
Chronological age (in months)			
Mean	133.00	129.70	133.63
Range	126-139	115-144	118-144
St Lucia word recognition reading age (in months)			
Mean	104.28	103.76	104.80
Range	89-121	79-120	77-126
Discrepancy between chronological age and reading age (in months)			
Mean	28.72	25.94	28.83
Range	18-47	18-51	18-53
Comprehension (PAT percentile rank)			
Mean	26.60	26.22	24.91
Range	1-50	1-64	1-60
Sex ratio (boys to girls)			
	10-15	15-12	9-13
Ratio of Year 5 to Year 6 subjects			
	8:17	20:7	7:15

of either conducting the training sessions for these students themselves, while the rest of the class worked on independent reading activities, or arranging for a resource person or teacher's aide to conduct the training sessions.

The readers experiencing difficulty were divided into the three conditions of approximately equal numbers and with approximately the same mean and range of word recognition reading ages and comprehension percentile rank scores. An additional consideration taken into account when allocating classrooms to the various conditions was that teachers from the same school were placed in the same experimental condition, so that they were unaware of the different procedures used in the other experimental conditions. Each condition was thus in a separate school, with no more than 3 classes used at any one school.

Characteristics of subjects in each of the conditions as they were finally organised are presented in Table 1. There were no significant pre-test differences between subjects in each condition.

Experimental design

An Instructional Type (3) x Year (2) x Testing Occasion (4) repeated

	Pre-test	Phase One Training Phase One	Mid-test	Phase Two Training Phase Two	Post-test	Phase Three Maintenance Phase	Maint-test
CONDITION 1		Metacognitive instruction in word identification strategies 2 x 30 mins per week		Reciprocal teaching of comprehension strategies (including use of metacognitive word identification strategies 3 x 30 mins per week		Continue with program 2 x 30 mins per week	
CONDITION 2		Traditional methods of word identification 2 x 30 mins per week Traditional comprehension activities 1 x 30 mins per week		Reciprocal teaching of comprehension strategies (with traditional methods of word identification) 3 x 30 mins per week		Continue with program 2 x 30 mins per week	
CONDITION 3		Reciprocal teaching of comprehension strategies (with traditional methods of word identification) 3 x 30 mins per week		Reciprocal teaching of comprehension strategies (with traditional methods of word identification) 3 x 30 mins per week		Continue with program 2 x 30 mins per week	
WEEKS INVOLVED	**3**	**8**	**2**	**8**	**2**	**8**	**2**

Figure 1: A schema of the experimental design

measures design was employed, with testing occasions being the within-subject factor. Testing took place prior to the commencement of the program (pre-test) and at the end of each of the first two eight-week training phases (mid-test and post-test, respectively) and four weeks after the end of the final eight-week maintenance phase (post-test), as depicted in Figure 1. Eight months elapsed between pre-testing and maintenance testing.

Instruction was undertaken by either: (i) the class teacher (seven classrooms in two different schools); (ii) a teacher's aide in cooperation with the class teacher (two classrooms in two different schools); or (iii) the remedial resource teacher in cooperation with the class teacher (five classrooms from the fifth school). All lessons were constantly monitored by the chief researcher during the first two weeks to ensure that the procedures outlined in training were being followed, with weekly monitoring during the rest of phase one and all of phases two and three. Subsequent analysis of the results did not reveal any significant differences in scores on the measures of reading and metacognitive abilities between the three types of teaching situations.

In those classrooms where the class teacher was the main implementer, instruction took place in a corner of the classroom while the non-participating readers worked on independent reading activities. Where a teacher's aide or resource teacher was the main implementer, the readers experiencing difficulty were withdrawn to a quiet area outside the classroom or to the remedial resource room where distractions would be at a minimum.

Measures

The students were administered a number of individual and group tests on each of the four testing occasions designed to measure several aspects of reading. Individual testing was administered by the same person who had no knowledge of group status of subjects. The assessment instruments used are described below.

1. St Lucia Graded Word Reading Test (Andrews, 1973) which is an untimed, individually administered test used to measure accuracy of word identification. It consists of one hundred words, graded in difficulty. The major item source was words from the widely-used Schonell Graded Word Reading Test (Schonell & Schonell, 1970), with the difficulty level of the words re-calculated on an Australian student population. Test-retest reliability for children at grades 4 and 5 was calculated at r=+0.947 (Andrews, 1973). An independent calculation of test-retest reliability by Westwood (1978) found a value of r=+0.96, and a cross validation correlation coefficient with the Standard Reading Test 1 (Daniels & Diack, 1958) of r=+0.86.

2. Metacognitive Abilities in Word Identification (Spedding & Chan, 1993, 1994), is an untimed, 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. Following the completion of each task item, students are required to justify their response in order to assess whether they are aware of the strategy they have used. For example, to assess the use of orthographic cues in unknown words, students are presented a pseudoword containing all or part of a real word (e.g., "meauty"). The student is asked to say the word and then justify their response. Examples of test words for phonic cues include "bear", "pear", "grear", and "fear", while test words for orthographic cues included "grundered", "meauty", and "hountry". Morphological cue words include "bicycle", "biplane", and "bifoot", while context cues would have an initial cue word such as "wound" and one or more sentences using this word, e.g., "Wound - He wound the fishing line onto the reel."

3. The Progressive Achievement Test (PAT) in Reading Comprehension (Reid & Elley, 1988) is a timed, standardised group test of silent reading comprehension. The test consists of a series of prose passages approximately two hundred to three hundred words in length, and graded in complexity from easy to hard. Following each passage there are multiple-choice items designed to measure both factual and inferential comprehension. A different form of the test was used on each testing occasion. The test items were planned and constructed to assess reading skills commonly accepted as important by expert teachers of reading. The items were also subject to review and revision by panels of educational and psychological personnel (to identify items that would assess important reading skills in books commonly used by children). Correlations between the PAT test and level of comprehension (as demonstrated on an oral test of comprehension based on graded reading passages) ranged from .86 to .89. Scores on the test were also correlated with three other commonly used reading tests, including a test of word recognition (r=+0.76), a measure of reading for meaning (r=+0.76) and a measure of word recognition and comprehension (r=+0.65 to +0.86). Reliability coefficient estimates involved split half reliability (r=+0.88 to +0.92), equivalent forms reliability (r=+0.83 to 0.89), and internal consistency reliability (KR-20; r=+0.87 to +0.92).

All subjects were tested on all measures on each of the four testing occasions of pre-test, mid-test, post-test and maintenance test, as outlined in the experimental design in Figure 1.

The training program

Student Instructional Materials were developed for use by subjects in each of the training conditions (Conditions One, Two and Three), except that subjects in Phase One of Condition Two used normal class materials. The instructional materials consisted of a total of 30 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 passages was structured to target a particular word identification strategy. For example, a passage might contain a number of multisyllabic words requiring students to make use of morphological and structural cues. Each passage was accompanied by a short answer comprehension test consisting of eight questions. The questions were designed to probe both factual and inferential comprehension of text.

The materials were compiled into two booklets, each containing 15 passages, along with

accompanying cartoon illustrations and question sheets. The booklets for subjects in Condition One (who were taught the metacognitive word identification strategies) also contained lists of the targeted words for each passage, as well as other words which could be decoded using the same strategy/ies.

Training of pupils

Condition One: *The Clever Kid's Reading Program* (used in Condition One) used metacognitive instruction for word identification within a reciprocal teaching format as developed by Palincsar and Brown (1984). To improve word identification skills, subjects were trained in the use of the Clever Kid's Cues: *Consider the context; Compare with known words*; and *Carve up the word parts*. To help monitor and control the use of these strategies, subjects were taught to use the Clever Kid's Motto: *Look for the Cues; Be flexible*; and *Ask: Does it make sense?*

A scaffolded instructional approach was used in which students were engaged in a number of activities designed to help them become familiar with the use of the strategies, and to incorporate the targeted words into their automatic sight vocabulary. The targeted words (22 to 32 per passage) were selected as being suitable for incorporation into sight vocabulary and to provide practice in the use of Clever Kids' cues. First, children were asked to read the title and predict what the passage might be about, thus cuing them into possible vocabulary to look for in the text. Then the teacher modelled and explained the particular strategy being targeted in the passage, e.g., the passage might contain a number of multi-syllable words requiring children to *Carve up the Word Parts*, or a number of words containing the 'tion' spelling pattern, requiring them to *Compare with Known Words*. Students were encouraged to use the *Consider the Context* strategy to confirm or deny whether the word selected by using the other two strategies made sense in that sentence. Every time an unfamiliar word was encountered, the group was encouraged to work collaboratively in using the Clever Kids' Motto and Clever Kids' Cues to identify the word, while the teacher provided guided feedback and coaching as necessary. During the second session children played flashcard games with the targeted words, and practised reading the passage either individually or in pairs, in preparation for a "one-minute-reading test" in which they endeavoured to see how many words from the passage they could read fluently in the given time. During the third session emphasis was placed on training students in a modified form of reciprocal teaching of comprehension strategies as described by Palincsar (1987). As prediction and clarification had already occurred during the first two days of the teaching cycle, the modified form of the program consisted of (1) generating questions about main text ideas and then answering their questions, and (2) providing a summary or elaborating on any summary provided. For comprehension testing, the subjects wrote short answers from recall to the eight orally presented comprehension questions which accompany each passage.

During phases two and three of the program, teachers concentrated on reciprocal teaching of comprehension while still incorporating the word identification strategies developed in phase one.

Conditions Two and Three: Teachers in Condition Two used traditional methods for identifying unfamiliar words and traditional text-book comprehension activities in phase one, changing to reciprocal teaching of comprehension along with traditional methods of word identification in phases two and three. Teachers in Condition Three used reciprocal teaching of comprehension strategies along with traditional methods of word

Table 2: Means And Standard Deviations Of The Dependent Measures for the Three Experimental Conditions

	CONDITION ONE		CONDITION TWO		CONDITION THREE	
	MEAN	SD	MEAN	SD	MEAN	SD
St Lucia						
Pre-test	40.13	6.77	39.04	7.81	40.00	12.37
Mid-test	47.25	9.16	43.08	8.58	44.40	13.24
Post-test	50.63	9.91	45.52	8.66	47.00	13.31
Maintenance Test	57.46	10.64	50.20	8.98	53.30	13.63
Metacognitive Abilities in Word Identification Use of Cues						
Phonic						
Pre-test	2.88	1.66	2.93	1.83	3.68	2.06
Mid-test	3.00	1.50	2.77	1.93	3.32	1.89
Post-test	4.04	1.24	3.62	1.77	4.00	1.38
Maintenance Test	4.76	1.20	4.04	1.69	4.27	1.42
Orthographic						
Pre-test	4.96	0.84	4.42	1.50	4.41	1.40
Mid-test	5.04	1.14	4.81	1.31	4.41	1.53
Post-test	5.12	1.17	4.92	1.38	4.86	0.94
Maintenance Test	5.04	1.37	4.96	1.37	5.27	1.03
Morphological						
Pre-test	3.80	1.58	2.81	1.52	3.05	1.59
Mid-test	3.72	1.43	3.27	1.56	2.59	1.62
Post-test	4.68	1.15	4.12	1.75	3.86	1.61
Maintenance Test	4.36	1.38	3.96	1.46	3.18	1.14
Context						
Pre-test	4.16	1.11	3.62	1.33	4.05	1.05
Mid-test	4.96	0.89	4.35	1.23	4.18	1.20
Post-test	5.64	0.64	5.08	1.35	5.32	1.00
Maintenance Test	5.80	0.58	5.77	0.51	5.77	0.61
PAT Comprehension Percentile						
Pre-test	27.67	15.04	26.22	17.58	24.91	16.81
Mid-test	43.92	22.78	30.85	18.90	33.46	19.45
Post-test	51.25	26.40	40.59	20.88	36.45	26.40
Maintenance Test	53.25	22.41	40.48	23.59	39.36	22.45

Table 3: Summary of Results of Group (2) x Occasion (4) Repeated Measures Analysis of Variance for St Lucia Accuracy Scores

SOURCE OF VARIATION	DF	SS	MS	F	p
Conditions 1 & 2					
Between Subjects					
Group	1	950.22	950.22	3.37	.073
Error	47	13264.33	282.22		
Within Subjects					
Occasion	3	5178.03	1726.01	156.87	.001
Group x Occasion	3	241.34	80.45	7.31	.001
Error	141	1551.42	11.00		
Conditions 1 & 3					
Between Subjects					
Group	1	315.66	315.66	0.68	.413
Error	42	19433.54	426.70		
Within Subjects					
Occasion	3	5320.34	1773.45	143.96	.001
Group x Occasion	3	105.11	35.04	2.84	.040
Error	126	1552.17	12.32		
Conditions 2 & 3					
Between Subjects					
Group	1	130.72	130.72	.30	.587
Error	43	18752.89	436.11		
Within Subjects					
Occasion	3	3482.88	1160.96	110.84	.001
Group x Occasion	3	29.99	10.00	0.95	.416
Error	129	1351.15	10.47		

identification throughout each phase of the study. Subjects were involved in the same 8-question comprehension testing procedures as described above for subjects in Condition One.

The traditional method of word identification, used in Conditions Two and Three, consisted of listing difficult words on the board either prior to or during the reading of the passage as the need arose and their pronunciation and meaning discussed with the children. No attempt was made to teach students independent strategies for identifying words. Traditional comprehension activities involved the use of regular comprehension work-book type activities (mainly using questions and summaries).

Instruction took place on three 30-minute sessions per week during training phases one and two, and two 30-minute training sessions per week, during training phase three, which was a maintenance phase. In general, one passage was studied per week. By the end of the third instructional phase, all classes had completed the first booklet (15 passages), and were part way through the second booklet, although some were further advanced than others. No class completed all 30 passages. No teacher claimed to use instructional materials other than those developed by the experimenter.

Teacher Instructional Materials: Teacher's guide booklets were prepared, outlining the procedures to be followed. The booklet for teachers in Condition One contained instructions in both metacognitive word identification strategies and reciprocal teaching of comprehension strategies. Teachers in Conditions Two and Three were given booklets containing only the reciprocal teaching of comprehension strategies. To provide additional assistance, laminated wall charts appropriate to the intervention they were undertaking were prepared for each teacher (i.e., Clever Kid's Cues, Clever Kid's Motto, and Reciprocal Teaching procedures for Condition One, and Reciprocal Teaching procedures only for Conditions Two and Three). The same charts were included in the pupil's workbooks. In addition, sets of flashcards containing the targeted words for each passage were prepared for teachers in Condition One.

Two videos containing instructional sequences were prepared for teacher viewing. The video shown to teachers in Condition One showed both metacognitive instruction in word identification strategies and reciprocal teaching of comprehension strategies. The video for teachers in Conditions Two and Three showed reciprocal teaching of comprehension strategies only.

Training of teachers (or teacher's aides/resource teachers) occurred in a number of stages. First, approximately 30 to 45 minutes was spent with each teacher explaining the strategies, viewing the video, and introducing the teacher's guide books and the pupil's instructional books. In some cases teachers kept the video overnight to view again at their leisure. After the teachers had been given one or two days to study the teacher's guidebooks and think through their instructional role, they were again contacted to see whether there were any further questions or issues that needed clarifying. Decisions were then made as to when, where and by whom instruction would be carried out.

The next step was for the chief researcher to teach the introductory lessons in each classroom while the teacher and (where applicable) resource teacher or teacher's aide observed. The first lesson was taught to the whole class so that the normally-achieving readers would have some understanding of what would be happening in the special reading group, and what the wall charts meant (Clever Kid's Motto and Cues and Reciprocal Teaching for Condition One and Reciprocal Teaching for Conditions Two and Three). The second lesson was taught by the experimenter to the poor reader group in each classroom, and provided further opportunity for modelling and explanation of the procedures for the teacher or teacher's aide.

The next two or three lessons (week two of the intervention) were taught by the teacher or aide/resource teacher while the experimenter observed and provided feedback and

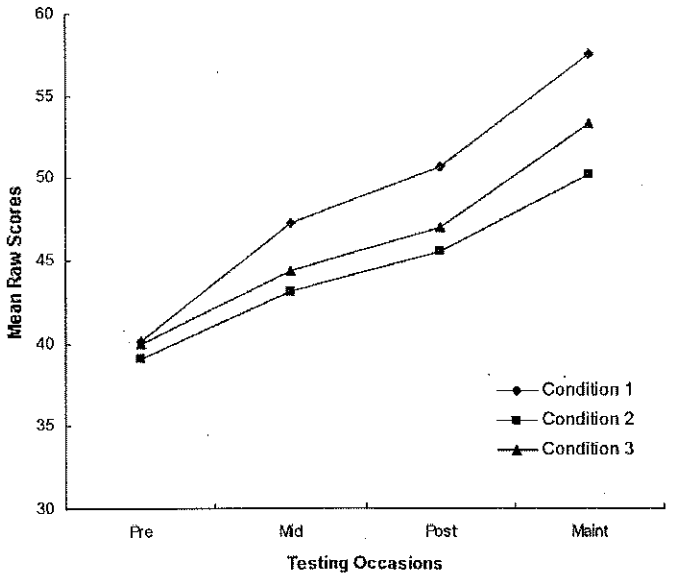


Figure 2: Mean raw scores of the three experimental conditions for the St Lucia Graded Word Reading Test across testing occasions

coaching as necessary. Thereafter, during Training Phases One, Two, and Three the experimenter visited each poor reader group weekly to ascertain that the procedures outlined in training were being followed correctly and to help correct any problems which may have arisen. By Training Phase Three, when the teachers and aides continued instruction for two days per week, input from the experimenter was minimal and typically involved minor clarification about training procedures.

RESULTS

Each of the three training conditions in this study was analysed using a separate Group (2) x Year (2) x Testing Occasion (4) repeated measures design. This analysis was conducted for each measure of reading used in the study. These analyses compared results from Conditions One and Two, Conditions One and Three, and Conditions Two and Three, respectively. Year level was found to be a significant factor only for the Metacognitive Abilities in Word Identification measure, and even then the results were inconsistent, possibly due to the small numbers in some of the class groups. For these reasons a second analysis was made for all measures using only Group and Testing Occasion. Sample sizes for the variables differed in some cases because of student absences during some testing occasions or because of missing data in some of the scales.

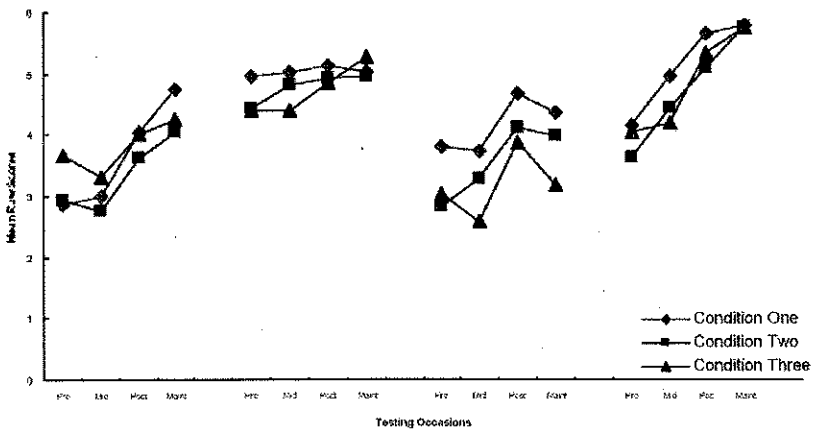


Figure 3: Mean raw scores of the three experimental conditions for use of metacognitive cues in word identification across testing occasions

Table 2 contains the group means and standard deviations of all the measures.

Word reading

The St Lucia Graded Word Reading Test (Andrews, 1973) was used to measure accuracy of reading words in isolation. This measure was used on each of the four testing occasions and results of repeated measures analyses of variance are shown in Table 3 below. It was predicted that subjects in Condition One, with an emphasis on metacognitive teaching or word identification, would improve at a greater rate on this test than subjects in Condition Two and Three which used traditional methods of word identification.

There were significant occasion main effects for Conditions One and Two $F(3,141) = 156.87$, $p<.001$; for Conditions One and Three $F(3,126) = 143.96$, $p<.001$;and for Conditions Two and Three $F(3,129) = 110.84$, $p<.001$. As shown in Figure 2 the mean raw scores of subjects in all conditions improved during the eight months which elapsed between the pre-test and the maintenance test.

Using $p<.01$ as the criterion for significance, there was a significant Group x Testing Occasion interaction which occurred between Condition One and Condition Two, $F(3,141) = 7.31$, $p<.001$; and a Group x Testing Occasion interaction which approached significance between Condition One and Condition Three, $F(3,126) = 2.84$, $p<.05$. Univariate results revealed that in both instances these interactions were located in the contrast between the first and second testing occasions, $F(1,47) = 13.93$, $p<.001$; and $F(1,42) = 5.92$, $p<.05$, respectively. As revealed in the graph in Figure 2 the Condition One subjects, who had received the benefits of metacognitive training in word identification strategies from pre- to mid-test, showed greater improvement on mean raw scores during this time period than did the subjects in Condition Two or Condition Three who had received traditional methods of identifying unfamiliar words. In addition, the interaction between Conditions One and Two approached significance in the contrast between mid- and post-test, with subjects in Condition One continuing to show greater improvement than those in Condition Two between the mid- and post-testing occasions.

Table 4: Summary of Results of Group (2) x Occasion (4) Repeated Measures Analysis of Variance for Use of Metacognitive Cues in Word Identification Results of Group (2) x Occasion (4) Repeated Measures Analysis of Variance for St Lucia Accuracy Scores

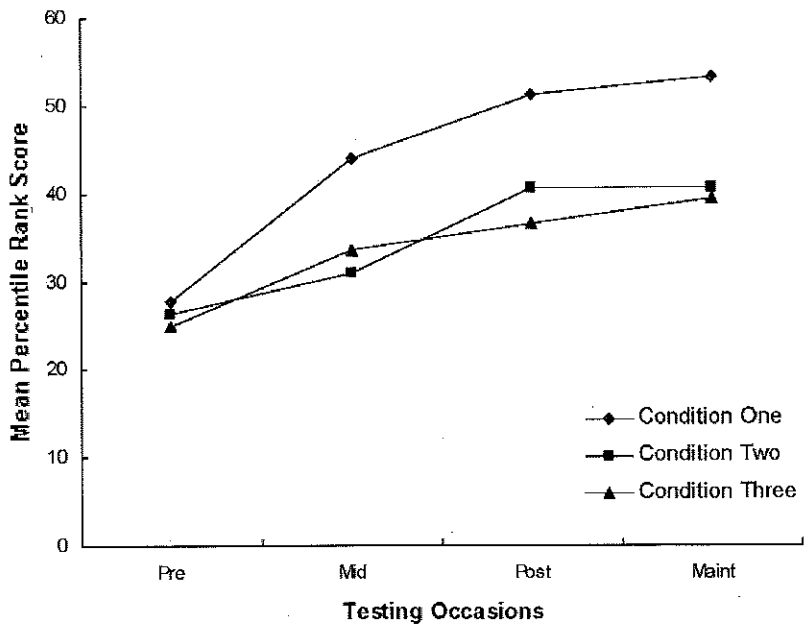
SOURCE OF VARIATION	DF	SS	MS	F	p
Conditions 1 & 2					
Phonic Cues					
Between Subjects					
Group	1	5.67	5.67	0.96	.332
Error	49	289.93	5.91		
Within Subjects					
Occasion	3	84.26	28.09	18.02	.001
Group x Occasion	3	3.97	1.32	0.85	.467
Error	147	227.91	1.55		
Orthographic Cues					
Between Subjects					
Group	1	3.48	3.48	0.84	.364
Error	49	202.50	4.03		
Within Subjects					
Occasion	3	3.50	1.17	1.34	.265
Group x Occasion	3	1.46	0.49	0.56	.644
Error	147	128.21	0.87		
Morphological Cues					
Between Subjects					
Group	1	18.45	18.45	3.31	.075
Error	49	273.39	5.58		
Within Subjects					
Occasion	3	41.84	13.95	12.68	.001
Group x Occasion	3	2.78	0.93	0.84	.473
Error	147	161.62	1.10		
Context Cues					
Between Subjects					
Group	1	9.78	9.78	5.10	.028
Error	49	94.05	1.92		
Within Subjects					
Occasion	3	105.87	35.29	48.70	.001
Group x Occasion	3	2.85	0.95	1.31	.273
Error	147	106.53	0.72		
Conditions 1 & 3					
Phonic Cues					
Between Subjects					
Group	1	1.03	1.03	0.17	.678
Error	45	265.45	5.90		
Within Subjects					
Occasion	3	57.54	19.18	15.00	.001
Group x Occasion	3	10.48	3.49	2.73	.046
Error	135	172.62	1.28		
Orthographic Cues					
Between Subjects					
Group	1	4.25	4.25	1.33	.255
Error	45	144.07	3.20		
Within Subjects					
Occasion	3	7.06	2.35	2.81	.042
Group x Occasion	3	5.36	1.78	2.13	.099
Error	135	113.03	0.8		

SOURCE OF VARIATION	DF	SS	MS	F	p
Morphological Cues					
Between Subjects					
Group	1	44.00	44.00	8.24	.006
Error	45	240.23	5.34		
Within Subjects					
Occasion	3	32.64	10.88	10.79	.001
Group x Occasion	3	1.62	0.54	0.54	.658
Error	135	136.14	1.01		
Context Cues					
Between Subjects					
Group	1	4.51	4.51	2.85	.098
Error	45	71.23	1.58		
Within Subjects					
Occasion	3	85.95	28.65	53.94	.001
Group x Occasion	3	3.95	1.32	2.48	.064
Error	135	71.71	0.53		
Conditions 2 & 3					
Phonic Cues					
Between Subjects					
Group	1	11.06	11.06	1.38	.246
Error	46	368.56	8.01		
Within Subjects					
Occasion	3	35.64	11.88	8.08	.001
Group x Occasion	3	1.81	0.60	0.41	.746
Error	138	202.92	1.47		
Orthographic Cues					
Between Subjects					
Group	1	0.07	0.07	0.01	.896
Error	46	205.92	4.48		
Within Subjects					
Occasion	3	13.66	4.55	4.80	.003
Group x Occasion	3	3.01	1.01	1.06	.368
Error	138	130.88	0.95		
Morphological Cues					
Between Subjects					
Group	1	6.46	6.46	1.07	.307
Error	46	278.54	6.06		
Within Subjects					
Occasion	3	38.78	12.93	11.13	.001
Group x Occasion	3	7.70	2.57	2.21	.090
Error	138	160.37	1.16		
Context Cues					
Between Subjects					
Group	1	0.78	0.78	0.31	.579
Error	46	114.20	2.48		
Within Subjects					
Occasion	3	110.76	36.92	52.44	.001
Group x Occasion	3	2.44	0.81	1.16	.329
Error	138	97.16	0.70		

Table 5: Summary of Results of Group (2) x Occasion (4) Repeated Measures Analysis of Variance for PAT Comprehension Scores

SOURCE OF VARIATION	df	SS	MS	F	p
Conditions 1 & 2					
Between Subjects					
Group	1	4571.19	4571.19	3.11	.084
Error	49	72029.81	1470.00		
Within Subjects					
Occasion	3	13082.49	4360.83	40.54	.001
Group x Occasion	3	1138.72	379.57	3.53	.017
Error	147	15811.69	107.56		
Conditions 1 & 3					
Between Subjects					
Group	1	5038.20	5038.20	3.38	.073
Error	44	65618.28	1491.32		
Within Subjects					
Occasion	3	10947.64	3649.21	26.48	.001
Group x Occasion	3	1031.47	343.82	2.49	.063
Error	132	18193.71	137.83		
Conditions 2 & 3					
Between Subjects					
Group	1	47.68	47.68	0.04	.849
Error	47	61349.17	1305.30		
Within Subjects					
Occasion	3	6307.62	2102.54	14.20	.001
Group x Occasion	3	278.07	92.69	0.63	.599
Error	141	20875.98	148.06		

Figure 4: Mean percentile rank scores of the three experimental conditions for the PAT silent reading comprehension across testing occasions



The mean raw scores of the Condition One subjects improved approximately seven points from pre- to mid-test. Using the test norms, this raw score increase represented a mean improvement in word recognition reading age of approximately nine months during the two month period. During the same time period, the mean raw scores of the subjects in Conditions Two and Three each improved approximately four points, representing a mean improvement in reading age of approximately five months each. The mean rate of improvement for the Condition One subjects paralleled that of the other two Conditions for the remaining two testing occasions. During the entire intervention, subjects in Condition One showed a mean improvement of approximately 17 points, while subjects in Conditions Two and Three showed mean improvements of approximately 11 and 13 points, respectively. Using test norms, these descriptive results represented an improvement in mean word recognition reading age of approximately 22 months, 15 months, and 18 months for Conditions One, Two, and Three, respectively.

Metacognitive abilities in word identification

The metacognitive abilities in word identification measures (Spedding & Chan, 1993, 1994) were taken on each of the four testing occasions, with parallel forms of the measure being used on each occasion. The results of repeated measure analyses of variance for each of the measures are shown in Table 4. It was predicted that subjects in Condition One, with emphasis on metacognitive teaching of word identification, would improve more than subjects in Conditions Two and Three.

There were significant occasion main effects for all but one of the measures. The exception was for the reported use of orthographic cues for Conditions One and Two. An examination of the graph in Figure 3 shows that subjects in each of the Conditions tended to make improved use of phonic, orthographic, and context cues for identifying unknown words, with each successive testing occasion. However, results for morphological cues tended to be inconsistent with a falling off in follow-up testing for all conditions.

This falling away for all subjects may suggest a need for more intensive instruction in the use of morphological cues (affixes and root words) for identifying unknown words than was provided by the teachers in this study.

While there were significant occasion main effects for nearly all measures, only one Group x Occasion interaction involving the Training Group and the Training Phase (Figure 1) approached significance (using a criterion of $p<.01$). This interaction involved the analysis between Conditions One and Three. A Group x Occasion interaction approaching significance occurred between Conditions One and Three for the reported use of phonic cues in the identification of unknown words, $F(3,135) = 2.73$, $p<.05$. Univariate results revealed that this interaction was located in the contrast between the pre- and mid-test, $F(1,45) = 3.50$, $p<.07$. As shown in Figure 3, subjects in Condition One showed improved scores for this measure from pre- to mid-test while the subjects in Condition Three had a decrease in scores from pre- to mid-test. The general lack of significant interaction effects would suggest that teacher implementation of metacognitive word identification strategies (considering context, comparing word parts and carving up words) was no more effective in developing metacognitive abilities in word identification involving orthographic, morphological and context cues than traditional methods of word identification.

Reading comprehension

The Progressive Achievement Tests (PAT) in Reading Comprehension (Reid & Elley, 1986) were used as a measure of silent reading comprehension, with two parallel forms used in an A B A B testing sequence. Summaries of the results of repeated measures analyses of variance are shown in Table 5 below. It was predicted that Condition One, with reciprocal teaching of comprehension and metacognitive instruction in word identification, would result in greater improvement in comprehension than the other two conditions, which used reciprocal teaching of comprehension, with traditional methods of word identification.

Results for the analysis of the PAT tests showed significant occasion main effects for all conditions, ($F(3,147) = 40.54$, $p<.001$ for Conditions One and Two; $F(3,132) = 26.48$, $p<.001$ for Conditions One and Three; $F(3,141) = 14.20$, $p<.001$ for Conditions Two and Three), indicating that significant improvement had occurred on the PAT raw scores for all experimental conditions during the eight months of the study. Univariate results revealed that these significant improvements occurred during the first two training phases for each condition (pre-test to mid-test, and mid-test to post-test), but not during the final training phase (post-test to maintenance test).

There were also two significant Group x Occasion interactions which approached significance using a criterion of $p<.01$. The first Group x Occasion interaction which approached significance occurred between Condition One and Condition Two, $F(3,147) = 3.53$, $p<.05$. Univariate results revealed that the interaction was located between the pre- and mid-testing occasion, $F(1,49) = 9.16$, $p<.01$. As shown in Figure 4, mean scores of the Condition One subjects increased more rapidly than those of the Condition Two subjects during this time period. The Group x Occasion interaction between Conditions One and Three also approached significance, $F(3,132) = 2.49$, $p<.07$. Once again univariate results suggested a significant interaction between the pre- and mid-testing occasions, $F(1,44) = 6.63$, $p<.05$, with the Condition One subjects showing more rapid improvement in mean scores than those in Condition Three, as indicated in the graph in Figure 4.

The mean percentile rank scores of the Condition One subjects improved approximately 16 points from pre- to mid-test. During the same time period, the mean percentile rank scores of the Condition Two subjects improved approximately five points, and those of Condition Three subjects improved approximately nine points. It was during this time period that subjects in Condition One received metacognitive instruction in word identification skills along with reciprocal teaching of comprehension strategies. Subjects in Condition Two at this time received their normal classroom word study and normal comprehension activities, and subjects in Condition Three received training in reciprocal teaching of comprehension strategies along with traditional methods of word identification.

An inspection of Figure 4 reveals that subjects in Conditions Two and Three made approximately parallel rates of improvement during each phase of the intervention. After the initial significantly greater improvement between the pre- and mid-test, the rate of progress for subjects in Condition One tended to parallel that of the other two Conditions. During the entire intervention period there was an improvement in mean percentile rank scores of approximately 25 points for subjects in Condition One and approximately 14 points each for subjects in Conditions Two and Three. These descriptive scores suggest that the method of reciprocal teaching used in this study for comprehension strategies may give students an initial advantage which is likely to be maintained. It may also suggest that giving teachers full responsibility for the program is an important factor in improved reading comprehension, as no significant interaction effects for silent reading comprehension were found when teachers took over responsibility for a similar program in an earlier study (Bruce & Robinson, 2000).

This improvement in reading comprehension scores for Condition One subjects parallels the improvement in word identification scores during the same time period. It would seem that as Condition One subjects became more proficient at word recognition, they might have been able to devote more of their attentional resources to comprehension of text (Perfetti, 1986; Spear-Swerling & Sternberg, 1994; Stanovich, 1992).

It should be noted however, that comprehension scores tended to plateau during the final maintenance phase, which may highlight the need for readers experiencing difficulties to have ongoing, intensive support in reciprocal teaching strategies if they are to maintain significant rates of improvement. It may also suggest that readers experiencing difficulty need ongoing and intensive training in word identification strategies, so that continual significant improvements in word identification may allow for increasing attentional resources to be devoted to the comprehension strategies being targeted in the reciprocal teaching dialogue (Perfetti, 1986; Spear-

Swerling & Sternberg, 1994; Stanovich, 1992).

SUMMARY OF FINDINGS

Effectiveness of the metacognitive program

Research question one firstly involved gauging the extent to which the metacognitive word identification program would improve metacognitive abilities in word identification of a group of upper primary readers experiencing difficulty. While the results showed significant improvement in the initial phases for word identification and comprehension, there was no significant difference on measures of knowledge and use of metacognitive abilities suggesting that the teacher implementation of the specific metacognitive strategies used in this program was no more effective than traditional methods of word study.

The fact that subjects in Conditions Two and Three, who did not receive metacognitive word identification training, made almost as much progress on a measure of use of metacognitive abilities as subjects in Condition One, is in contrast to the results in a previous study (Bruce & Robinson, 2000) which were clearly in favour of those receiving the metacognitive word identification training. In the previous study, however, metacognitive abilities in word identification were measured at only the pre- and mid-testing occasions. Further testing at the close of the interventions may have shown fewer differences between the experimental and control groups in these studies. In addition, school-based personnel may not have been as effective at emphasising metacognitive awareness and monitoring of word identification strategies as was the researcher, who was responsible for the metacognitive awareness training in a previous study (Bruce & Robinson, 2000). This would be consistent with research indicating that many teachers experience difficulty in adopting a more strategic approach to teaching without ongoing collegial coaching and support (Anderson & Roit, 1993; Vaughn, Kligner & Hughes, 2000; Wong, 1997).

The daily attention to traditional methods of word study provided in Conditions Two and Three may have contributed to these students' growing metacognitive abilities in word identification as well as their significant improvement in word identification skills. Research into best instructional practices in word recognition and word identification for students with a learning disability suggests that any direct or indirect word study (McCormick & Becker, 1996), along with sufficient exposure to print to allow specific words and subword representations to become permanently remembered (Ehri, 1999; McCormick, 1994), will lead to reading improvements for these students.

The second part of research question one involved comparing the effectiveness of a metacognitive approach to teaching word identification strategies with the effectiveness of a traditional approach to identifying unfamiliar words to a group of upper primary students who were experiencing difficulty. The metacognitive instruction in word identification strategies had a greater initial facilitative effect on students' word recognition abilities than use of traditional methods of identifying unfamiliar words, as found in a previous study (Bruce & Robinson, 2000). While the daily exposure to word pronunciations and meanings which occurred in the traditional teaching process enabled these students to improve their word recognition performance (McCormick & Becker, 1996), the results for Condition One demonstrated an even greater initial facilitative effect for the metacognitive word identification intervention strategies in the pre- to mid-test phase (Gaskins et al., 1996-1997; Lovett et al., 2000). It was during this phase that such strategies were used most intensively.

The slowing of rate of improvement in word recognition scores for the Condition One subjects after the mid-testing occasion, was also a pattern consistent with the previous study. At this time, instruction in metacognitive word identification strategies became less intensive, being only part of the clarification process in the reciprocal teaching procedures. Even though it was observed during the weekly monitoring visits for fidelity of implementation that the teachers did encourage students to use the Clever Kid's Cues where appropriate, improvement in word recognition performance was not so rapid once intensive instruction in metacognitive word identification strategies was withdrawn. This result may reflect the need for ongoing and intensive metacognitive strategy instruction if readers experiencing difficulty are to gain automaticity and fluency in word identification (Gaskins et al., 1996-1997; Spear-Swerling & Sternberg, 1994). This may be especially so for students who enter the program with a number of "roadblocks" to success such as maladaptive cognitive styles, poor self-concepts, attitudes of learned helplessness, and poor home support (Spear-Swerling & Sternberg, 1994).

The third part of research question one involved comparison of the effectiveness of a program involving a metacognitive approach to teaching word identification strategies combined with reciprocal teaching of comprehension strategies, with that of a program focusing only on reciprocal teaching of comprehension strategies and using the traditional approach to identifying unfamiliar words. Once again, all groups improved but there was more improvement for subjects in Condition One, who received the combined package of metacognitive word identification strategies and reciprocal teaching of comprehension strategies. These results suggest that while the methods involved in Condition One were more effective, intervention methods used in each of the three conditions were useful for improving the comprehension strategies of the readers experiencing difficulty in this study. This is an important finding in view of a critical review of the research by Rosenshine and Meister (1994) which reported that students with poor decoding and comprehension strategies (i.e., the subjects of this study) were less likely to gain significant benefits from reciprocal teaching interventions than students whose problems were related to comprehension alone and not decoding ability. These were the type of students selected for intervention in the original reciprocal teaching research (Palincsar, 1987; Palincsar & Brown, 1984). Rosenshine and Meister (1994) found that when readers with poor decoding and comprehension strategies were tested with standardised tests, as opposed to experimenter-developed tests, these tests usually yielded non-significant results.

As each intervention method also resulted in improved word identification scores, it could be implied that one of the reasons for

significant improvements in comprehension for the readers experiencing difficulty in this study was improvement in lower-order word processing skills. As indicated earlier, increased proficiency at the word level has been claimed to allow students to devote more attentional resources to higher order cognitive processes (Perfetti, 1986; Spear-Swerling & Sternberg, 1994; Stanovich, 1992).

When metacognitive instruction in word identification strategies was combined with reciprocal teaching of comprehension strategies (Condition One) rates of improvement were greater. This result suggests that specific metacognitive instruction in word identification strategies can significantly enhance the effectiveness of reciprocal teaching procedures for readers experiencing difficulty in comparison to reciprocal teaching combined with traditional methods of word study. This conclusion receives support from the fact that the greatest rate of improvement for subjects in Condition One occurred during the first phase of the study, when students were receiving intensive metacognitive instruction in word identification strategies.

The similar improvements in mean comprehension scores for subjects in Conditions Two and Three suggest that the longer time period devoted to reciprocal teaching procedures in Condition Three, was no more effective for improving comprehension than traditional classroom word study/comprehension activities and a shorter reciprocal teaching intervention (Condition Two). These results support claims by Palincsar (1987) that twenty days of intervention followed by weekly booster sessions are usually sufficient for gaining and maintaining improvement from reciprocal teaching strategies. The plateau in the maintenance phase for comprehension, however, may suggest the need for ongoing, intensive support in both word identification strategies and reciprocal teaching strategies if readers experiencing difficulty are to maintain significant rates of improvement (Torgesen, 2001). Even though subjects in all conditions had made significant improvements in word identification by the time of the maintenance test, there was still a discrepancy between mean chronological and word recognition reading ages of approximately 14 months for Condition One, 20 months for Condition Two, and 17 months for Condition Three, indicating that their decoding abilities were still below grade level, and that they were unlikely to have reached the stage of automaticity in word identification which would allow full cognitive resources to be devoted to higher order processes (Perfetti, 1986; Spear-Swerling & Sternberg, 1994; Stanovich, 1992). This would be consistent with evidence that reciprocal teaching works best for those students for whom it was originally intended, i.e., students who are adequate decoders but poor comprehenders (Kligner & Vaughn, 1996; Moore, 1988; Palincsar & Brown, 1984; Rosenshine & Meister, 1994). However, the facilitative effects of the combined metacognitive word identification and reciprocal teaching program during phase one for subjects in Condition One, suggests that an ongoing, intensive program of this type may enable readers experiencing difficulty to maintain significant rates of improvement in both word identification and comprehension scores.

Implementation of the program in regular classroom conditions

A number of findings and implications arise out of the three purposes for implementing the program in regular classroom conditions.

The **first purpose** was to examine the effectiveness of a model for implementation of the program by the regular teacher in the classroom setting. In a previous study (Bruce & Robinson, 2000), the program was set up for readers experiencing difficulty and then the class teachers gradually assumed responsibility for its implementation. However, there was little evidence that teachers continued to use metacognitive strategies when given the responsibility. In this current study, class teachers or resource personnel within the school were responsible for implementation of the entire program. The services of the researcher were required only for the initial explanation and modelling of the procedures, and for constant monitoring of lessons in the first two weeks and weekly monitoring thereafter to check for fidelity of treatment.

The significant occasion main effects for most measures in this study clearly show that the program could be successfully implemented using school-based personnel, without the need for ongoing instruction by the researcher or any person from outside the school system. Furthermore, as reported earlier, an inspection of test scores showed that similar results were obtained whether the readers experiencing difficulty were taught by the classroom teacher, the resource teacher, or a teacher's aide. This result suggests that a variety of school-based personnel may be trained to implement the program effectively.

A **second purpose** was to examine the effects of the model on students experiencing reading difficulty only. In a previous study (Bruce & Robinson, 2000) normally-achieving readers were included in the training strategies as it was felt that the combination of group support, shared expertise and the role models which they provided in the reciprocal teaching dialogue would facilitate the use of the strategies by the readers experiencing difficulty (Palincsar, David, Winn & Stevens, 1991). However, most teachers in the previous study found it easier to cater for all class members by conducting whole class rather than small group sessions. This meant that the readers experiencing difficulty were often overshadowed by their more dominant normally-achieving peers, and therefore had less opportunity for participation in the interactive dialogue. Also, in the whole class situation, some teachers tended to control the dialogue rather than allowing pupils to develop in their role as teacher. This may have been the reason why most of the significant results in the previous study occurred in the experimenter-led, rather than the teacher-led, phase of the study.

The frequent significant occasion main effects in each phase of the intervention for this study implied that readers experiencing difficulty could benefit when training was directed solely at them. For example, univariate results showed occasion main effects for the St Lucia word recognition scores for each of the conditions on all of the testing occasions. The PAT comprehension univariate results showed significant occasion main effects on the mid-test and post-testing occasions, although not on the maintenance test. For the metacognitive abilities in word

identification measure there were occasion main effects for most of the cues on most of the testing occasions. The fact that subjects continued to show improvement throughout the intervention may have been because they had more opportunity for participation in the interactive dialogue in the small group situation, as advocated by Palincsar (1986, 1987) and Palincsar and Brown (1986). Another contributing factor may have been that students felt more comfortable participating with classmates of similar ability, rather than with classmates of greater competence (Gottlieb, 1984). These factors may have been enhanced by the cyclic effects of improved word identification for facilitating comprehension of text, through more reliable use of context cues for recognition of unfamiliar words (Foorman, Francis, Fletcher & Lynn, 1996; Yeu & Goetz, 1994), and through increased automaticity, allowing greater cognitive resources to be devoted to construction of meaning (Näslund & Samuels, 1992; Samuels, Schermer & Reinking,1992; Stanovich, 1992).

Organisational factors may also have contributed to the more successful implementation for only the group experiencing reading difficulties. It was easier for teachers in this study to provide special instruction for only the group of readers experiencing difficulty, especially as they had the option of either teaching the group themselves (while the rest of the class worked on independent reading activities), or using the services of a resource teacher or teacher's aide to teach the small group while they taught the rest of the class. In a previous study (Bruce & Robinson, 2000), this support was not available, and most teachers found it difficult to organise reciprocal teaching dialogues for all of their reading groups, so they resorted to whole class instruction. In this situation, readers experiencing difficulty were often overshadowed by normally-achieving peers, which highlights some of the difficulties and challenges of translating research into classroom practice (Scruggs & Mastropieri, 1996; Stanovich & Stanovich, 1997; Vaughn et al., 2000).

The **third purpose** of this study was to assess methods of creating interest in the metacognitive word identification segment of the program. As discussed previously, it had been observed in a previous study (Bruce & Robinson, 2000) that many students lost interest after several weeks of the metacognitive word identification activities. Instruction in oral reading alone did not seem sufficient to maintain interest and attention for these pupils, and it was not until the reciprocal teaching of comprehension segment was introduced that their interest was reactivated. In an attempt to maintain student interest throughout the intervention it was decided to introduce reciprocal teaching of comprehension strategies in a modified form along with the initial instruction in metacognitive word identification strategies during the first phase of this study. Discussion with the teachers or assistants involved confirmed that student motivation was maintained during the word identification segment of the program, which suggests that methods developed to create interest were effective, which is consistent with reported evidence of the highly motivated nature of reciprocal teaching procedures (Palincsar, 1987; Speece et al., 1997). The reported greater motivation may also be reflected in the significant increases in reading age on the St Lucia, especially in Phase One (see Figure 2), and by significant improvements in use of phonic and context cues in word identification during Phase One (see Figure 3). The increased motivation may have also influenced comprehension, with significant gains in phase one on the PAT being maintained during Phases Two and Three (see Figure 4).

CONCLUSION

While metacognitive research (both laboratory and classroom-based) has provided valuable insights into effective methods for improving the comprehension of readers experiencing difficulty, there has been little parallel research into metacognitive approaches to teaching word identification skills. This study has suggested that a metacognitive word identification and reciprocal teaching program can be successfully undertaken by school-based personnel, but such a classroom-based model is more successful when teachers have responsibility for its implementation from the beginning. This may have been because teachers who had entire responsibility felt a greater ownership of the program, leading to more faithful implementation of each of its components (Giangreco, Edelman, Luiselli & MacFarland, 1997).

There were, however, a number of limitations and questions which arise from the results of this project which could be the basis of future research. First, subject samples were drawn from a limited urban to semi-urban area of the NSW (Australia) coast. There was also a lack of diversity of ethnic background among students in this semi-urban area, which was less than could be expected in larger metropolitan settings. Replication in other areas would help validate the results. In addition, as different teachers were used for different treatment conditions, there is a possibility of different quality of teachers across conditions, although the teacher training and monitoring for consistency of program implementation minimised such differences in this study. Without constant monitoring and training, some teachers may be more effective in developing these strategies.

There was also a restriction to the amount of coaching and modelling which the researcher provided for teachers. Teachers may need a great deal of coaching, modelling and support if they are to adopt a style of teaching which promotes metacognitive awareness and monitoring of strategies (Carnine, 1997; Wong, 1997). A greater degree of collaborative support may also allow teachers to explore a variety of options for implementation, including ways of effectively providing strategy instruction for the whole class so that all pupils may benefit. Future research in this area could include investigations into the effectiveness of peer tutoring and cooperative learning groups for teaching both the word identification strategies and the reciprocal teaching of comprehension. It should be mentioned, however, that despite the restricted coaching and modelling time, teachers in Study Three indicated that they were happy with the progress made by their readers experiencing difficulties as a result of the intervention.

Questions also remain as to the optimal length of the intervention. In this study, when teachers were responsible for implementation of the program, there was a levelling off of improvements during the final phase of the study, especially for

comprehension. Future research could explore whether increased time devoted to the first phase of the study, i.e., intensive word identification strategy instruction plus a modified form of reciprocal teaching, would lead to continued significant improvements in comprehension. It may be that more time devoted to increasing fluency in word identification in a format which children find motivating (i.e., combined with modified reciprocal teaching), would lead to more effective and efficient benefits when reciprocal teaching is more fully implemented at a later stage. This seemed to be the case in an earlier study (Bruce & Robinson, 2002), when experimental subjects, who had the benefit of instruction in metacognitive word identification strategies prior to reciprocal teaching of comprehension, made just as rapid gains in silent reading comprehension after a few weeks of reciprocal teaching, as had the control subjects who received reciprocal teaching with traditional methods of word identification throughout the intervention.

A related question concerns the impact of age and prior experience on the effectiveness of the program. Results for a number of the measures indicated that Year 5 subjects did not make as much progress as those in Year 6. It may be that younger students require a longer and more intensive intervention, in order to make the same progress as Year 6 subjects. Further research could explore the effectiveness of the program for varying age groups, e.g., middle primary school (Years 3 and 4) and lower secondary school (Years 7 and 8), along with the length of intervention required for the maximum benefit for each of these levels.

A further question concerns the nature of groups used in the study. This study demonstrated that small homogeneous groups could benefit from a reciprocal teaching program, but this success may relate to the homogeneity of the group rather than the success of the instruction. Further research could evaluate the effectiveness of the program for small heterogeneous groups compared to small homogeneous groups.

Reciprocal teaching of comprehension strategies and metacognitive approaches to teaching word identification have been identified as effective tools in the search for methods to assist children with reading difficulties. This study has helped verify their value and has shown that they can be effectively implemented in regular class situations. More study is needed, however, of the nature of modifications necessary for effective implementation in the regular class, the optimum length of intervention and the most effective model for teacher training.

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