Strategy Instruction and Teacher Professional Development to Aid the Reading Comprehension of Year 4 students.

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ABSTRACT

The ability to understand what one reads is fundamental to much school learning and is part of the school curriculum. The processes used by expert readers to comprehend text can be analysed and used as a basis for comprehension instruction. Such expert readers use particular mental strategies such as rereading, paraphrasing, and predicting, and adapt these to assist them in understanding various texts.

This study investigated whether the implementation of reading comprehension strategy instruction to classes of Year 4 students would result in significant gains in metacognitive abilities, standardised reading comprehension, and reading self-efficacy. The quasi-experiment involved a treatment group of 48 students in two classes who were taught by one teacher, a treatment control group of 61 students in three classes taught by three teachers, and a non-treatment control group of 41 students taught in three composite Year 3 and Year 4 classes taught by three teachers. In total, 150 Year 4 students from eight classrooms in three suburban primary schools were involved in the study.

Results from 2 x 3 analyses of variance (ANOVA) with repeated measures revealed differences between the treatment group and control groups in several aspects of reading comprehension ability. The treatment group performed significantly better than either control group on the Jacobs and Paris (1987) measure of metacognitive awareness of strategies (Index of Reading Awareness). Treatment group students were also more confident about their ability to perform tasks related to reading comprehension than one of the control groups. Though they also made greater gains in confidence than the other control group, these gains were not statistically significant. Gains in reading comprehension as measured by a standardised reading comprehension

measure (Progressive Achievement Test of Reading Comprehension) were marginal in comparison to one of the control groups, and not significant in comparison to the other.

Secondly, this study also investigated whether intensive teacher training would result in successful implementation of reading comprehension strategies. Teachers need to know how to model their own mental processes for students so that students can see the strategies being applied. They then need to demonstrate for students when and how to adapt the strategies to various texts. In addition, teachers need to know whether to target instruction to only the struggling readers in their classrooms, or to students of varying abilities.

A two-year professional development programme was developed and implemented to assist primary school teachers with the implementation of reading comprehension strategy instruction in their classrooms. During the first year a group of 14 teachers participated, and during the second year one teacher remained to implement the programme. This teacher, who taught at the Year 4 level, was provided with additional professional development in the explicit teaching of reading comprehension strategies to her entire class of mixed ability students.

Results from analysis of qualitative data indicated that the teacher had made significant progress in becoming competent in the teaching techniques needed for teaching reading comprehension strategies. These results suggested that the teacher moved from modelling process into content to being creative and inventive. By the end of the intervention, interviews conducted with the teacher and the students, as well as lesson observations and field notes, suggested that she had a good knowledge of the components of strategy instruction and was incorporating these in her classroom practice. Her students became increasingly aware of the teacher's central lesson aims

regarding what she was teaching, why she was teaching it, and how it could be applied to the students' learning.

The findings of the present study indicate that students of varying ability may improve their reading comprehension through instruction in reading comprehension strategies, though the marginal gains in standardised reading comprehension do not support this conclusively. Findings also indicate that a teacher can successfully be trained to implement reading comprehension strategy instruction in an entire class of mixed-ability students. Such findings have important implications for teacher and student education.

DEDICATION

This thesis is dedicated to my wonderful husband, Rob. Without his constant concern and cajoling I would never have completed this task. His determination that this project would be done brought him many conversations about reading comprehension, many proofreading tasks, and many household chores - while his wife laboured in the study. He is an outstanding man, worthy of double honour.

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CHAPTER 1

Introduction

According to a recent review of literacy education practices in the United States, "Some … good third-grade readers will progress on their own to proficiency in reading, but many will not. Many will need explicit, well-designed instruction in reading comprehension to continue making progress. Yet, we do not have an adequate research base for designing and implementing effective reading comprehension instruction" (Snow, 2002). The aim of this study is to add to the existing research on the teaching of reading comprehension by examining who can benefit from effective reading comprehension instruction, and how classroom teachers can be trained to implement effective reading comprehension strategies to help all students in their classes improve in their ability to understand text.

Those who are considered 'expert' at understanding what they read use various strategies while reading. For example, expert readers re-read when they do not understand, try to infer information not stated in the text, relate information in the text to their personal prior knowledge, make predictions about upcoming text, relate information in a clause to the passage as a whole, and paraphrase information (Olshavsky, 1976-1977; B. Wade & Moore, 1998; S. E. Wade, 1990; Wyatt et al., 1993). When they encounter a comprehension difficulty, expert readers are aware that they need to use a strategy to help them solve the difficulty. Their success in understanding text by using appropriate strategies motivates them to both continue reading and to use strategies (Pressley, 1986; Pressley, Borkowski, & Schneider, 1989).

In more recent years, researchers have surmised that effective reading comprehension instruction should lead to students emulating the practices of expert

readers. Methods of instruction have been developed to inform students about the strategies available to help them understand text, and to help them find ways of adapting those strategies to particular texts. Thus, effective instruction has focussed on how to assist students to be active when mentally processing text, and how to choose appropriate strategies to solve comprehension difficulties.

In order to train students to be mentally active and aware of reading strategies, researchers have sought ways to make evident their own cognitive processing as they are reading, and then encourage students to emulate these mental processes for themselves. This way of teaching became known as 'explicit instruction'. Proponents of explicit instruction suggested that teachers should, through verbalisation, make evident the particular mental processes associated with a strategy, and then coach students to apply this strategy in appropriate reading situations (Duffy, 1993a; Duffy, 2002; Roehler & Duffy, 1991).

In an 'extremely well-designed study' (Adams, Treiman, & Pressley, 1998, p. 324), Duffy and his colleagues trained 20 randomly assigned third-grade teachers how to make decisions about when and how to explain the mental processing associated with reading strategies to students in their low reading groups (Duffy et al., 1987). Duffy trained the teachers to use what he called 'Direct Explanation', which included selecting a strategy based on observed student needs, and teaching that strategy by mentally modelling how it is used to facilitate good understanding of authentic texts. To do this, teachers were instructed to be explicit about when, where, and how they would use the strategy. During the course of a series of lessons on a particular strategy, teachers were also trained to gradually diminish their explanations, encouraging students to increasingly verbalise their own use of the strategy.

Compared to control group students, the low-group students in Duffy's study, who were given various post-test measures, improved significantly in their understanding of when, where, and how to use reading comprehension strategies (metacognitive knowledge). A subsequent study of 'Transactional Strategies Instruction' (R. Brown, Pressley, van Meter, & Schuder, 1996), which is very similar to 'Direct Explanation', resulted in significant gains in standardised reading comprehension for low-group students. Similar teaching practices at Benchmark School, a school near Philadelphia which specialises in teaching bright students who struggle to learn to read (Gaskins & Elliot, 1991), also led to reading comprehension gains for underachieving readers (Gaskins & Baron, 1985).

The commonality among these and many other studies (R. Brown, Pressley, van Meter, & Schuder, 1996; Dole, Brown, & Trathen, 1996; Duffy, Roehler, & Herrmann, 1988; El-Dinary, 2002; Gaskins, 1995; Jacobs & Paris, 1987; Palincsar & Brown, 1984; Paris & Cross, 1984; Paris, Saarnio, & Cross, 1986), is that they focus on students in low reading groups. The concern of Snow (2002), however, is that many third-grade readers, (and not just those in low reading groups), will need explicit instruction in reading comprehension if they are to progress to proficient reading.

Although research has focussed on using training in reading comprehension strategies to benefit students struggling to read, instruction in reading comprehension could benefit all students, good and poor readers alike (Andre & Anderson, 1979; A. L. Brown & Smiley, 1978; Gordon & Braun, 1985; Hare & Borchardt, 1984; Langer, 1984). All readers could improve by being made consciously aware of which strategies are available and how to use them. This study adds to the existing research literature by reporting the results of training a teacher to implement reading comprehension strategy instruction with a whole class, rather than with students in low reading groups only. In

order to train this teacher, procedures found to be successful in previous studies were implemented.

The training of teachers to teach reading comprehension is a complex process which takes considerable time. This is due to the need for particular teaching techniques which are not commonly used, that is, verbalising mental processes, as well as accurate teacher judgements about when and how to coach students to use strategies. In studies conducted in the United States, researchers have estimated that it could take up to three years for a teacher to become proficient in teaching reading comprehension strategies (R. Brown & Coy-Ogan, 1993; El-Dinary & Schuder, 1993; Pressley et al., 1992). During this training, teachers required a multi-faceted approach which included demonstrations within the teacher's own classroom, coaching, sustained support, and opportunities to discuss strategy teaching with others involved in professional development (R. Brown & Coy-Ogan, 1993; Duffy, 2004; El-Dinary & Schuder, 1993; Pressley et al., 1992).

Even after providing this level of professional development support, researchers still commented on teachers' slow progress in becoming proficient at teaching reading comprehension strategies (Almasi, 2003; Duffy, 1993a; El-Dinary & Schuder, 1993). Duffy (1993b), who devised a continuum of nine 'points of progress' that teachers seem to go through in learning to teach strategies, found that teachers "seemed to be locked into a technical approach to teaching strategies; they wanted me to provide them with explicit directives they could follow narrowly, and they resisted using their own judgement to create appropriate responses to students' emerging understandings" (Duffy, 1993a, p. 243).

The time needed for both the professional developer and the teacher to become adept at implementing reading comprehension strategies is a key factor in the paucity of

such instruction in classrooms. Although instruction in reading comprehension strategies is seen as beneficial to students of all ability levels, it is still not widely practised either internationally or within New Zealand (Baker, 2002; Lai, McNaughton, MacDonald, & Farry, 2004; McNaughton, Lai, MacDonald, & Farry, 2004; Pressley, 2002a; Shake & Allington, 1985; Simpson & Nist, 2002).

This study is an attempt to use the methods identified as necessary in training teachers to become good strategy teachers, (demonstrations within the teacher's own classroom, coaching, sustained support, and opportunities to discuss strategy teaching with others involved in professional development) to train a teacher in a New Zealand context to implement reading comprehension strategy instruction. This study therefore augments existing literature by examining the points through which one teacher progressed as she became increasingly proficient at teaching reading comprehension strategies in a whole class situation.

In summary, the relationship between instruction in reading comprehension strategies and improved reading comprehension and metacognition for low ability students has been well established, yet research on the effectiveness of this instruction on students of all ability levels has been lacking. In addition, though teachers who receive professional development in the knowledge and techniques necessary for reading comprehension instruction have helped students make significant gains in reading, the time-consuming nature of the professional development practices needed in order to train teachers to become proficient at explaining strategies has led to a paucity of such instruction.

In view of this situation, the purpose of the present research was to investigate whether reading comprehension strategy instruction would result in improvement in reading comprehension, metacognitive abilities, and confidence in reading for an entire

class of Year 4 students. Such knowledge should offer a basis upon which to design future reading comprehension curricula.

In addition, the present study also investigated whether a teacher could be trained to successfully implement reading comprehension strategy instruction in a whole class situation by means of intensive tutoring in the theory underpinning reading strategies and the techniques that accompany strategy instruction, researcher modelling, and focus groups where teachers get together to discuss difficulties and successes in implementation. Results from this aspect should assist future professional developers in planning effective programmes for teacher education.

CHAPTER 2

Review of the Literature

> *Philip ran up and heard the Ethiopian court official reading Isaiah the prophet, and said, "Do you understand what you are reading?" And he said, "Well, how could I, unless someone guides me?" And he invited Philip to come up and sit with him.* Acts 8:30, 31

Reading is an important part of modern life. In the Western world all children are given instruction in reading as part of their compulsory education. As with the Ethiopian court official, however, successful reading requires not only an ability to decode text, but also an understanding of what is read.

The ability to both decode and comprehend what one reads has been conceptualised in *the simple view of reading*, namely, that reading equals decoding times comprehension, or R = D x C (Gough & Juel, 1991). According to this formula, if there is no decoding, reading is not taking place. Conversely, if one can decode but not comprehend (as may happen, for instance, when 'reading' a foreign language), reading is still not taking place. Most reading educators would agree that both decoding and comprehension skills are necessary in the reading process.

Research on reading comprehension suggests, however, that schools do not focus sufficiently on strategies to improve comprehension. For example, in 1978 Durkin conducted a study focussed on how reading comprehension was being taught in American schools. She found that comprehension instruction occurred very infrequently.

Almost three decades later, a similar concern was still being raised. In 2004 the RAND Corporation Reading Study Group was given the task of proposing strategic guidelines for a long-term research and development programme on the teaching of reading comprehension. The Office of Educational Research and Improvement of the United States Department of Education commissioned this research because it saw the teaching of reading comprehension as one of the most pressing issues in literacy (Snow, 2002). Some of the evidence cited for this concern included a lack of improvement in secondary students' text comprehension results, poor performance of United States' students compared to students outside the United States, and unacceptable gaps in performance between students from different demographic groups.

The problem of poor reading comprehension is also evident in New Zealand schools. A recent four-yearly review of the reading comprehension abilities of students in Years 4 and 8 (Crooks & Flockton, 2005) found that students in Year 8 had declined by three percent in their ability to understand text, while Year 4 students had remained at the same level. This result was surprising as there was an eight percent increase in oral reading ability for both Year 4 and Year 8 students between 2000 and 2004.

Additionally, results from the 1990-91 and 2001 Trends in the IEA's (International Association for the Evaluation of Educational Achievement) study, indicated that New Zealand Year 5 students' reading comprehension was not as good as other countries' (Ministry of Education, 2005d). The study, which examined reading comprehension abilities of Year 5 students from nine different countries, ranked New Zealand fourth in both 1990-91 and 2001. Of the nine countries tested, four (Greece, Slovenia, Iceland, and Hungary) showed significant increases in mean literacy scores between 1990-91 and 2001, four had no significant increase (Italy, Singapore, New Zealand, and the United States), and one (Sweden) showed a significant decrease in reading achievement.

Both the lack of a significant increase for New Zealand, and its ranking compared to other countries, is a disappointment. Other countries have progressed while New Zealand has remained static.

Furthermore, the PIRLS (Progress in International Reading Literacy Study) findings did not show New Zealand Year 5 students' ability to comprehend as being particularly good compared to 34 other countries (Ministry of Education, 2005c). New Zealand students' ability to interpret, integrate, and evaluate text ranked tenth, and their ability to use retrieval and straightforward inferencing ranked twelfth. Some of the countries that performed better than New Zealand were Sweden, the Netherlands, Bulgaria, and England.

In order to examine why these concerns persist, general approaches to the teaching of reading comprehension need to be considered. The traditional skills approach to the teaching of reading comprehension will first be considered. This approach will then be contrasted with cognitive understandings of the reading comprehension process and how they can be controlled by the reader. Finally, programmes of successful reading comprehension instruction will be examined, along with teacher-training methods. The review concludes with a discussion of the paucity of such instruction in New Zealand, which in turn provides a major rationale for the current study.

Skills Approach to Reading Comprehension

Contemporary understandings of a systematic reading comprehension strategy approach as a method of teaching comprehension arose from dissatisfaction with existing practice. Pearson and Stephens (1998) suggest that behaviourism was the indirect, albeit negative, motivation for the comprehension strategy approach. From a behaviourist perspective, reading was considered to be

> a skill that could be decomposed into a component set of subskills involved in both decoding and comprehension. Examples of comprehension subskills included sequencing events in a story, predicting outcomes of a story, drawing conclusions, finding the main idea, and so forth. Further, it was believed that reading could be improved by teaching students each of these necessary subskills to a minimal level of mastery. (Dole, Duffy, Roehler, & Pearson, 1991, p. 240)

Such programmed instruction led to a heavy emphasis on the teaching of skills in isolation, using workbook activities in an overall lock-step approach to reading. Isolated skills teaching resulted in reading lessons where more time was spent *writing* in workbooks, than *reading* the text.

In 1978 a seminal study into how reading comprehension was being taught in classrooms showed the negative impact of the behaviourist skills approach (Durkin, 1978). The study was conducted as a result of concerns that the teaching of reading comprehension was not effective for addressing reading problems (Durkin, 1978).

To examine how reading comprehension was being taught, Durkin conducted observations in 36 grade 3 to 6 classrooms in 13 different school systems within Illinois. She found that almost no time was spent teaching reading comprehension. Rather, teachers spent the bulk of their time *assessing* comprehension through questioning and written work, rather than *teaching* comprehension. These findings prompted researchers to study reading comprehension – what it comprised, how it could be controlled, how to teach it, and how to train teachers to teach it.

What Does Reading Comprehension Comprise?

To examine what constitutes reading comprehension, researchers studied how meaning is represented in the mind, and how these mental representations lead to

comprehension of text. Schema theory, story grammar theory and analysis (A. L. Brown & Day, 1983), Kintsch and van Dijk's model (1978), and dual coding theory (Sadoski, Paivio, & Goetz, 1991) all influenced the teaching of reading comprehension.

Schema Theory

Described as the most prominent representational theory of the 1970s and 1980s (Adams, Treiman, & Pressley, 1998), schema theorists challenged the behaviourist skills approach to reading comprehension by stressing the role of the reader's prior knowledge in actively understanding text. This prior knowledge included knowledge about the world as well as knowledge about different discourse types – e.g. stories, scientific texts, newspaper articles, and knowledge about linguistic style (Perfetti, 1985). Prior knowledge was structured into schemata (packaged units of knowledge) as a result of repeated experiences with objects and events (Garner, 1988; Rumelhart, 1980).

At issue for schema theorists was how the reader's knowledge already stored in memory (schemata) functioned in interpreting new information and adding that information to the knowledge store. Schema theorists proposed that text was comprehended when it was either placed in a mental 'home' within the knowledge store, or when a mental home was modified to accommodate the new information (Adams, Treiman, & Pressley, 1998; Anderson, 1994; Anderson, Mason, & Shirey, 1984; Dymock & Nicholson, 1999; Garner, 1988; Pearson & Stephens, 1998; Rumelhart, 1980).

As an example of an abstract knowledge schema, Anderson and Pearson (1984) cited the knowledge an individual might have about an event such as a ship christening. The various 'slots' within this schema might include the purpose (to bless the ship),

where it is done (in dry dock), by whom (a celebrity), and when it occurs (just before launching of a new ship), and how the christening action is represented (breaking a bottle of champagne suspended on a rope against the ship).

Activation of such a schema could affect attention, memory, and the ability to form inferences (Anderson, 1994; Anderson & Pearson, 1984; Anderson, Reynolds, Schallert, & Goetz, 1977; Dole, Duffy, Roehler, & Pearson, 1991; Pearson, Roehler, Dole, & Duffy, 1992; Rumelhart, 1980). According to schema theory, the reader allocates attention based on the importance of the upcoming text elements. This importance is gauged by the schema into which the text has been assimilated, the already processed information, and an analysis of the demands of the reading task. As the reader reads, the text is processed and graded for importance. Extra attention is given to elements deemed important, which, in turn, are better learnt and remembered than other less important elements (Anderson, 1994; Anderson & Pearson, 1984).

Anderson and Pearson (1984) cited studies that examined the link between schemata and the allocation of attention. In one study conducted by Rothkopf and Billington (1979), high school students who read a passage with simple learning objectives in mind (e.g., 'What is the name of the scale used by oceanographers when recording the colour of water?') spent more time on sentences relevant to those objectives than students who read with no objectives in mind. Findings from the Rothkopf and Billington study would seem to indicate evidence for a selective-attention model (Anderson & Pearson, 1984). In this model, learning objectives activate a schema into which the text is assimilated. The text, being read with these objectives in mind, is graded for importance. Extra attention is devoted to elements that meet the criterion of importance. As a result of this extra attention, important text elements are better learnt and remembered.

Secondly, schema theorists proposed that a person's schemata influenced their memory of text. Goetz, Schallert, Reynolds and Radin (1983) (also cited in Anderson & Pearson, 1984) found that policemen, people training to be real estate agents, and college students varied in the details they recalled from a passage they read that was ostensibly about what two boys did at one boy's home whilst truanting. Their recollections differed depending on whether they took the perspective of a burglar, a person interested in buying a home, or no particular perspective. Readers reading the same passage, but with different purposes for reading, will remember different details (Anderson & Pearson, 1984).

Thirdly, inferences readers gleaned from texts are influenced by schemata. On a macro scale, inferences may be involved in deciding which schema or schemata a reader should activate in order to make sense of a passage as a whole. Newspaper headlines, for example, may provide sufficient information to assist the reader in inferring that a ship-christening schema will be needed in order to understand the article. On a micro scale, a reader's inferences may assist the reader in filling slots within a selected schema, either by assigning given information into various slots, or by inferring slots for information that the author has not included (Anderson & Pearson, 1984).

In a study that showed the effects of schemata on inferences, college students were given two ambiguous texts. One could be read either as if it related to a prisoner planning an escape from a cell, or a wrestler trying to get out of his opponent's hold. The second could be read as a group of friends meeting either to play cards, or to practise a quartet. Students majoring in physical education chose the wrestling schema for the first passage, while music majors chose the quartet practice schema for the latter passage. The study suggested that schema selection is often based on inference, that the schema one selects influences the amount and nature of recall, and that once a schema

has been selected, it will drive other inferences (Anderson, Reynolds, Schallert, & Goetz, 1977).

Based on findings from schema theory, teachers were encouraged to modify their instruction from a skills-based assumption that the goal of education was to find out what children's knowledge gaps were and to then go about filling those gaps, to an emphasis on using the knowledge that children already had to help them understand new ideas (Pearson & Stephens, 1998). Applied to the teaching of reading comprehension, schema theorists assumed that many children do not spontaneously activate and integrate their background knowledge with what they are reading. Therefore schema theorists urged teachers to help children activate relevant knowledge before reading, set a purpose for reading, and make predictions prior to and during reading (Anderson & Pearson, 1984). In order to form inferences, readers were encouraged to actively make links between what the author wrote and their own background knowledge (Almasi, 2003; Anderson, 1994; Beers, 2003; McEwan, 2004; Ogle, 1986).

In addition to schemata that were specific to the content of a passage being read, some schema theorists began experimenting with larger-scale theoretical schemata. These schemata were also thought to affect students' processing and memory of text. One of the larger scale schemata that had an effect on the teaching of reading comprehension was 'story grammar' (Rayner & Pollatsek, 1989).

Story Grammar Theory and Analysis

In story grammar theory and analysis, readers' apprehension of the structure of stories was studied. Fictional stories, for example, have a conventional structure that includes a beginning, an initiating event that leads to a goal or problem, a series of

attempts to achieve the goal or overcome the problem, and character reactions to the resolution. Good readers understand this structure intuitively, but some researchers hypothesised that not all children understand story grammar, and, even if they do, many fail to use this knowledge to comprehend stories (Adams, Treiman, & Pressley, 1998).

In a study designed to improve the reading comprehension of third and fourth grade readers, Idol (1987) taught students to use a story mapping technique that included identifying the setting, problem, goal, action, and outcome of various stories. Students' reading comprehension, as measured by researcher designed tests, improved as a result.

Three other studies assessed fourth-grade readers' response to instruction in narrative structure. In two of these studies (Fitzgerald & Spiegel, 1983; Short & Ryan, 1984), fourth grade students of average or below average reading ability were given story grammar training. In another study (Greenewald & Rossing, 1986), fourth grade students from two fourth grade classes were randomly assigned to either experimental or control groups. In each of these studies, students' reading comprehension scores on researcher-designed tests improved as a result of the story grammar instruction they received.

The emphasis in schema theory in general, as well as in story grammar analysis, on the activation of background knowledge prior to reading was, however, criticised. According to schema theorists, in order to comprehend text a relevant schema must first be activated. Critics such as Kieras (1985) noted that this would not be possible in school situations where students were required to read material (e.g. technical prose) for which they had little or no background knowledge. Such material would need to be dealt with "at the level of individual propositions that convey new information" (Garner, 1988, p. 10).

Kintsch and van Dijk Model

Applying aspects of schema theory as well as bottom-up processing, Kintsch and van Dijk (1978) proposed a model of text comprehension that addressed the problem of comprehension of texts for which the reader had inadequate background knowledge. Described as 'perhaps the most influential theory of how the process of text comprehension takes place' (Rayner & Pollatsek, 1989, p. 289), Kintsch and van Dijk's model provided more detail on how information in text is understood and stored in memory, how attention is allocated to particular aspects of text, and how inferences are formed in the absence of content-schematic knowledge.

Kintsch and van Dijk (1978) viewed the process of comprehension as one of moving from bottom-up to top-down processing as the reader makes sense of what is read. At the bottom-up level they proposed that skilled readers parse texts into micropropositions – the smallest units of meaning. Using top-down processes, these micropropositions are then linked into a coherence graph which forms the microstructure. Microstructures combine to form the gist or main ideas of the passage, known as macropropositions. As the text is read, for each proposition constructed from the text, the reader retrieves a few associatively related propositions from long-term memory (including inferences). From these, highly interconnected propositions are selected for text representation, while others are discarded. The macrostructure is built as aspects of the microstructure are slotted into a pre-existing schema (Adams, Treiman, & Pressley, 1998; Eysenck & Keane, 2002; Kintsch, 1998; Kintsch & van Dijk, 1978; Rayner & Pollatsek, 1989; Sadoski & Paivio, 2001; Solso, MacLin, & MacLin, 2005; van Dijk & Kintsch, 1983).

Kintsch and van Dijk's model provided more detail on how text is remembered than schema theory did. Highly interconnected propositions are the ones most often

referred to in the text, resulting in them being called into working memory more frequently than other propositions. As a result, these propositions join together to form the 'gist' (or schema) and are better remembered than weakly connected propositions (Alba & Hasher, 1983; Rayner & Pollatsek, 1989).

During the process of comprehending a text, attention is also focussed on highly interconnected propositions. Micropropositions are formed during a processing cycle where a particular set of propositions are linked to the next set. Only key propositions are attended to, as these are kept and linked. Less attention is paid to weakly linked propositions, which do not fit into the overall schema.

Where a proposition is weakly linked to the overall macrostructure, the reader searches their memory for some relevant information that can be used as a connecting idea. If none is found, the reader then constructs an inference to bridge the gap (Alba & Hasher, 1983; Rayner & Pollatsek, 1989).

Although Kintsch and van Dijk's 1978 model was criticised for being 'vague' and 'oversimplified' (Rayner & Pollatsek, 1989), it did provide a framework for further research. A number of researchers assumed that the construction of macropropositions was not as skilled in children as in adults, because children are unaware of the relative importance of various propositions (A. L. Brown & Day, 1983; Hare & Borchardt, 1984). To aid children in forming macropropositions, Hare and Borchardt (1984) taught a summarising strategy which combined Kintsch and van Dijk's 1978 model with summarisation protocols obtained from children and adults.

Hare and Borchardt (1984) identified five operations critical to creating summaries:

1. Delete irrelevant information.
2. Delete redundant information.

3. Create a superordinate label for a list of things or actions (e.g. 'food' for beef, carrots, pie, and salad).
4. Try to locate topic sentences for paragraphs.
5. Invent topic sentences when they are unable to be located.

They found that students' memory and comprehension of text improved as a result of the intervention.

Kintsch and van Dijk's model helped further the understanding of what is involved in reading comprehension, by integrating bottom-up processing of text with the top-down processes. The more precise nature of the model, in comparison with the general principles suggested by schema theory, allowed researchers to more specifically target comprehension strategies to help children better understand what they read.

Dual Coding Theory

Another model of text comprehension which arose out of dissatisfaction with schema theory was dual coding theory (Sadoski, Paivio, & Goetz, 1991). Unlike Kintsch and van Dijk (1978), who focussed on the importance of bottom-up processing in text comprehension, Sadoski, Paivio and Goetz (1991) were concerned that "in characterising all knowledge as being represented abstractly, schema theory has ignored the roles of imagery and emotional response in reading" (Sadoski, Paivio, & Goetz, 1991, p. 465). Dual coding theory, therefore, included these elements.

Dual coding theorists proposed that knowledge is composed of complex networks that include verbal and imaginal representations (Pressley, 2002b). The verbal system contains word-like codes that are sequentially organised and only arbitrarily related to what they represent - the word 'book' for example, has no resemblance to an actual book. The imaginal system, on the other hand, contains nonverbal representations that

are non-sequentially, spatially organised and are similar to the perceptions that gave rise to them (for example, the image and perception of an actual book). Elements in the verbal and imagery systems are linked and capable of operation independently, in parallel, or in a connected way (Adams, Treiman, & Pressley, 1998; Sadoski & Paivio, 2001).

Dual coding theory proposes that readers go through three levels of processing when comprehending text. The first level is termed the *representational level* and involves reading the printed words. Next, at the *referential level*, connections are made between the verbal and imagery systems. Thirdly, at the *associative level*, connections are made separately within the verbal system, and within the imagery system. At each level an underlying structure in memory is activated, and different aspects of comprehension are experienced (Sadoski & Paivio, 2001).

In contrast to schema theory, dual coding theorists suggest that the cognitive system is dormant until the text is read. Meaning is then built up in a bottom-up fashion, but is also restricted in a top-down fashion "as verbal and nonverbal contexts limit the likely alternative for activation" (Sadoski & Paivio, 2001, p. 89). The theory also suggests that both verbal and imaginal representations are required for a thorough understanding of text.

Several researchers (Pressley, 1976, 1977; Purnell & Solman, 1991), applied dual coding theory to the teaching of reading comprehension. Pressley (1976) put the case that children's imagery generation during reading was not as extensive as it could be, and that training in imagery construction would increase activation of the imagery system, which would, in turn, increase understanding of the text. Working with grade 3 children, Pressley (1976) modelled how to construct mental images for texts containing very concrete items. Groups of four to six students received a small amount of training

(several minutes) that involved reading sentences and then forming mental images immediately afterwards. At the completion of the lesson, both experimental and control group children were given a comprehension test on the passage they had read. Experimental group children remembered significantly more of the passage than control group children, suggesting that an 8-year-old's memory of a very concrete, easily imageable story can be improved by using mental imagery.

Purnell and Solman (1991) tested high school students' comprehension of technical material both with and without illustrations. In four of the five experiments conducted, content presented in the form of both text and illustrations resulted in higher comprehension than content presented either only in text or in illustrated form. The researchers concluded that their findings "support the importance of providing different access routes to the comprehension of content, and are thus consistent with Paivio's (1971, 1986) dual coding theory" (1991, p. 294).

In sum, as a result of findings in schema theory, story grammar theory, Kintsch and van Dijk's model, and dual coding theory, the concept of reading comprehension has changed from a static perspective where children completed workbook exercises, to a more dynamic model of cognitive processing. These representational theories suggested that if children failed to understand, the problem might lie in their inability to construct adequate representations of the text. Their failure to actively use their background knowledge, understand the structure of fiction, generate accurate macropropositions, or form images to capture the semantic relations in a story, may be the cause of their poor understanding. Teaching specific strategies to counter these inadequate text representations was found to raise comprehension ability.

This new understanding of reading comprehension, in which readers were active processors of information, led to other research into learners' knowledge and use of

cognitive resources. Two bodies of research, that developed by information-processing cognitive psychologists in the area of 'executive control', and that by developmental psychologists in the area of 'metacognition', are particularly relevant.

Theory and Research on Comprehension Control

The notion of executive control was borrowed from information processing models of cognition. Likening human cognition to computer programmes, information processing approaches suggested that, between the input and output of information from the cognitive system, cognitive processes are involved in "taking in information, performing mental operations on it, and storing it" (Garner, 1988, p. 21). These processes are controlled by an executive system able to predict capacity limitations, be aware of its repertoire of strategies, identify and characterise the problem at hand, plan and schedule appropriate problem-solving strategies, monitor and supervise the effectiveness of the routines called into service, and evaluate the success or otherwise of these operations (Brown, 1978, cited in A. L. Brown, Bransford, Ferrara, & Campione, 1983).

One of the methods used to assess the nature of executive functioning within various cognitive domains is to ask subjects to think aloud while performing a task. This think-aloud procedure (verbal protocol analysis) was used by a number of researchers (Baker, 2002; Pintrich, Wolters, & Baxter, 2000; Pressley, 2000b; K. F. Thomas & Barksdale-Ladd, 2000) to assess the ways readers monitor their comprehension.

Verbal Protocol Analysis

The reading comprehension strategies used by various readers have been studied. Analyses of the verbal protocols of good and poor grade 10 readers (Olshavsky, 1976-1977), good and poor grade 2-9 readers (S. E. Wade, 1990), undergraduate university students (S. E. Wade, Woodrow, & Schraw, 1990), and university professors (Wyatt et al., 1993) yielded similar results. Across these studies, good strategy users re-read segments of the text that were not understood, attempted to infer information not stated in the text, related information in the text to personal prior knowledge, made predictions, related information in a clause to the overall theme of the passage, and paraphrased.

The strategies observed in good readers differed from skills. A skill, in keeping with a more behaviourist view, is an action that is automatic (Almasi, 2003). A strategy, in contrast, is deliberate, flexible, and planful, and is selected to meet a particular goal (Garner, 1988). Strategies do not replace skills, as processes such as automatic recognition of words are necessary for reading to occur. However, strategies are also a necessary aspect of reading comprehension as they allow for the flexibility needed to cope with the demands of various texts.

Researchers (Paris, Saarnio, & Cross, 1986; Pressley & Afflerbach, 1995; Pressley, El-Dinary, & Brown, 1992) argued that the strategies used by expert readers should be taught to children. Strategies identified by verbal protocol analysis became the basis for much individual strategy instruction. These strategies were not taught as automatic processes, however. The deliberate, flexible, and planful use of strategies was incorporated in the teaching in line with research findings on metacognition and cognition.

Metacognition

Metacognition has variously been described as a 'fuzzy' concept (Garner, 1988), a 'many-headed monster' (A. L. Brown, Bransford, Ferrara, & Campione, 1983), and a concept that defies consensus (Jacobs & Paris, 1987). Researchers have generally overcome the problems inherent in the definition of the term by referring to two strands: knowledge that one has about a cognitive domain, and the self-management of one's thinking (Baker, 2002; Gardner, 1985; Hacker, 1998; Jacobs & Paris, 1987).

Knowledge about a cognitive domain includes what Paris, Lipson and Wixson (1983) termed declarative, procedural, and conditional knowledge. These types of knowledge can affect the appraisal of one's abilities or knowledge, evaluation of the task, or consideration of strategies to be used. Declarative knowledge, or knowing *that*, includes knowledge about task structures and one's beliefs about the task and one's abilities (Almasi, 2003). For example, readers need to know that non-fiction texts include such things as headings and diagrams, and that comprehension goals will differ when reading non-fiction as opposed to fiction texts. Examples of beliefs about the task and one's abilities could include the attitude that reading is boring, or that one is a slow reader. Thus, declarative knowledge includes the kind of information involved in setting goals and adjusting actions depending on task conditions (Paris, Lipson, & Wixson, 1983).

In order to be a good comprehender, one must not only know that strategies exist but also how to execute them (Garner, 1992). So, when reading non-fiction texts, students must know how to skim and scan headings and diagrams in order to find the information they are seeking. This is termed 'procedural knowledge'.

Having gained declarative and procedural knowledge, students are able to move from being novice to expert strategy users. However, unless students know when to

apply particular strategies, they will still not be able to apply their knowledge in situations without direct teacher guidance. To do so, they need conditional knowledge – knowledge of when and why to apply various actions. So, for example, in reading non-fiction text, students need to know when to change from skimming and scanning headings and diagrams to a more detailed reading of the text, in order to achieve the intended reading goal.

Duffy and his colleagues conducted various studies where teachers deliberately made evident the declarative, procedural, and conditional knowledge associated with reading comprehension strategies (Duffy & Roehler, 1987; Duffy, Roehler, & Herrmann, 1988; Duffy et al., 1986). Teachers explained to students which strategy needed to be learnt (declarative knowledge), when it would be used in the upcoming selection (conditional knowledge), and the critical attribute one must attend to in order to successfully apply the strategy (procedural knowledge) (Duffy, 2002). Control students, in contrast, received basal textbook skill instruction. The studies resulted in treatment students having an increased awareness of the need to be strategic when reading, as well as higher scores on non-traditional and maintenance measures of reading achievement. In addition, treatment students performed significantly better on the word study subtest of the Stanford Achievement Test (a standardised test), than control students. The word study test required students to choose a suitable base word from a list of options (e.g. choosing either 'plane', 'planned', or 'plan' for the word 'planning') (Duffy et al., 1987).

The second aspect of metacognition, the self-management of one's thinking, has been described as "metacognition in action", or "mental processes that help to orchestrate aspects of problem solving" (Paris & Winograd, 1990, pp. 11, 18). Three processes are involved. The first of these is planning, which involves selecting and

coordinating a cognitive means in order to achieve a cognitive goal. Secondly, one needs to evaluate one's thinking. Thirdly one needs to regulate one's cognition, revising and modifying plans as necessary (Jacobs & Paris, 1987).

In a study that tested the benefits of reading comprehension strategy instruction on metacognitive self-management, Jacobs and Paris (1987) taught third and fifth grade students a series of reading comprehension strategies. The instruction included providing explicit information, practice, and discussion about cognitive strategies. Students were given information about the strategy being taught by means of a metaphor, comprehension monitoring being likened to traffic signs (need to 'stop' and paraphrase, 'yield' and look up words in the dictionary), for example. The strategy was then practised during the reading of specific texts and completion of worksheets, where appropriate strategies were selected and recalled. Discussions before the activities focussed on how, when, and why to use the strategies, whereas discussions after activities stressed the ease, benefits, or difficulties of using each strategy. Students were encouraged to use the strategies when reading both narrative and expository texts. The intention of the lessons was to convince the students of the value of using strategies independently, and thus encourage self-management of reading comprehension.

In order to test whether the instruction had benefits for metacognitive self-management, Jacobs and Paris (1987) devised a 20-item multiple-choice test they called *Index of Reading Awareness.* The test was divided into five-item sections that measured evaluation, planning, regulation, and conditional knowledge. Children in the experimental group achieved significantly higher scores on this measure than their control counterparts after a year of metacognition instruction.

Motivation

Two aspects of metacognition – self-knowledge of cognition, and self-management of cognition – are effortful. In order for children to exert the effort necessary for metacognitive thinking, they need to be motivated to do so. This motivation will be shaped both by self-efficacy, and by the factors to which success and failure are attributed.

Self-efficacy has been defined as "the judgements people form of their ability to organise and execute actions that are needed to accomplish specific learning-related tasks" (Chapman & Tunmer, 2003, p. 7). These judgements are hypothesised to influence task choice, effort, and persistence (Schunk, 2003). Students who judge themselves capable of using a comprehension monitoring strategy, for example, will be more likely to persevere with a challenging reading.

Cognitive modelling is an important means of promoting self-efficacy (Schunk, 2003). As students see the declarative, procedural, and conditional processes associated with a strategy modelled, they gain confidence in their ability to use the strategy. Student engagement in learning also promotes self-efficacy (Linnbrink & Pintrich, 2003). Students who have had a strategy cognitively modelled should be more cognitively engaged, resulting in greater self-efficacy in regard to the task.

In a study designed to test the effects of cognitive modelling of reading comprehension strategies on student self-efficacy, Schunk and Rice found a positive relationship (1992). Fourth and fifth grade poor readers who were given instruction that included declarative, procedural, and conditional factors associated with reading comprehension strategies had higher self-efficacy scores than control students who were given only declarative knowledge.

Attribution theory is similar in a number of ways to self-efficacy theory and posits that motivation is influenced by the students' perceptions of their own competence. This self-perception can be attributed to factors that are either external or internal to themselves (Bong & Clark, 1999; Gambrell, Palmer, Codling, & Mazzoni, 1996; Pressley, Goodchild, Fleet, Zajchowski, & Evans, 1989). If students believe, for example, that success is due to external factors such as luck or assistance from experts, they are inclined to feel helpless in the face of failure, leading to a poor self-concept. If, on the other hand, they attribute their success to effort, which is an internal and controllable factor, they are more likely to persist, leading to a heightened self-concept (Borkowski, Chan, & Muthukrishna, 2000; Marzano et al., 1988).

Students who are internally motivated can use reading strategies to great advantage, provided they have the correct metacognitive beliefs about strategy use. These beliefs include perceptions of one's ability to use particular strategies successfully, recognition of the utility of the strategies, and valuing the success that strategy use brings (Borkowski, Carr, Rellinger, & Pressley, 1990; Paris & Winograd, 1990).

In a study designed to assess the value of training in metacognitive beliefs, underachieving readers in grades 3-5 received strategy-plus-attribution training (Carr & Borkowski, 1989). Students were randomly assigned to either a strategy-plus-attribution group, a strategy-only group, or a control group. The two groups who received strategy instruction were trained to implement three strategies (finding the topic word and sentence, summarising, and questioning) in six half-hour sessions, applying the strategies to six new paragraphs per session. The training was identical for the two strategy groups, apart from the addition of a discussion with the strategy-plus-attribution group during the third, fourth, fifth and sixth sessions. During these

discussions, the instructor used cartoons representing four attributional beliefs, (luck, others, difficulty of task, and help), to examine the importance of effort in the production and correct use of strategies. The control group read identical passages to the two strategy training groups and completed the set written exercises, but did not receive any training on how to implement the strategies. Prior to and at the conclusion of the study, students were tested on their strategy use (as measured by evidence of the three taught strategies in free written responses to read paragraphs), recall performance (assessed by students' ability to recall paragraphs five minutes after reading), reading grades (obtained from the school before the experiment and at the end of the school year), and attributional beliefs (measured by the Krause (1983) attributional questionnaire which assessed children's thoughts about the importance of effort, luck, help, difficulty of material, and ability). On all these non-standardised tests, the strategy-plus-attribution students made significant gains compared to both the strategy-only group and the control group.

Similarly to those proposing representational theories, metacognitive theorists assumed that children generally did not use metacognitive processes effectively to direct their own thinking. Studies of 8 to 9 year-old readers found that they were often unaware of both the skills they were learning, and the factors that influenced their reading (Myers & Paris, 1978). Other studies found that primary school children, in general, were often not aware that they did not understand what they were reading (Markman, 1979).

Through verbal protocol analysis, studies in metacognition, and findings from motivational studies, the elements of a new approach to the teaching of reading comprehension were formed. Rather than comprising a set of skills, reading comprehension was now regarded as a collection of strategies that one needed to know,

regulate, and be motivated to use. The skills approach to the teaching of reading comprehension was thus replaced with a metacognitive strategy approach.

The Development of Internalised Cognitive Competence

With a growing realisation that the difficulties that children were experiencing with reading comprehension were due to deficits in their use of metacognitive strategies, methods of teaching such strategies began to be explored. Work by Vygotsky (translated in 1978), and Meichenbaum (1977), assisted researchers in framing ways to teach cognitive processes.

Vygotsky (1978) suggested that novices learn best when their learning is 'scaffolded' by an expert. Part of the difficulty in teaching students reading comprehension using a metacognitive strategy approach was how teachers could move from teacher-regulation of the strategy to student self-regulation – how learning could be scaffolded.

The term 'scaffolding' refers to instruction that provides students with precisely the support needed to implement the strategy. This means that the teacher needs to engage in open dialogue with the students to assess their cognitive needs, fading out the support as students become increasingly independent in their use of the strategy, thus moving from 'other-regulation' to 'self-regulation' (Baker, 2002; Gaskins & Elliot, 1991; Paris & Winograd, 1990; Pearson & Raphael, 1990; Roehler & Cantlon, 1997). The nature of this dialogue was studied by Meichenbaum who defined metacognition in cognitive-behavioural management terms as "the self-communication one engages in, or the internal dialogue one emits before, during, and after performing a task" (Meichenbaum & Asarnow, 1979a, p. 24). This internal speech was theorised to be teachable through

overt verbalisation by the teacher (Meichenbaum, 1977; Vygotsky, 1978). This finding led to scaffolded 'explicit instruction'.

Proponents of explicit instruction suggest that teachers should, through verbalisation, make evident the particular mental processes associated with the strategy, coaching students to apply the strategy in new and different situations (Duffy, 1993a; Roehler & Duffy, 1991). Explicit instruction is a potentially difficult process, as teachers need to be aware of their own metacognitive processing before they can assist others in this process. It is also labour-intensive, requiring skill in guiding student dialogue, and accurate teacher judgment of student competency levels (Baker, 2002; Paris & Winograd, 1990; Sinatra, Brown, & Reynolds, 2002). As student dialogue is an important window into the workings of cognitive processes, teachers were encouraged to engage as many students as possible in dialogue, a pattern termed 'every pupil response' or EPR (Gaskins, 1995; Gaskins, Anderson, Pressley, Cunicelli, & Satlow, 1993). In contrast, patterns of dialogue that included only the teacher and one student at a time were considered less desirable. These patterns were termed IRE, the teacher Initiates dialogue by asking a question, the student Responds, and the teacher Evaluates the student's response (Gaskins, 1995; Gaskins, Anderson, Pressley, Cunicelli, & Satlow, 1993). Despite the difficulties in conducting open classroom dialogue, studies of scaffolded explicit instruction show that effective transfer of cognitive processing from teacher to student can be achieved (Almasi, 2003; Duffy, 2003; Duffy et al., 1987; Meichenbaum & Asarnow, 1979b).

In summary, research in the late 1970s and early 1980s changed both the theoretical understanding and classroom teaching of reading comprehension. Durkin's concerns about the lack of reading comprehension instruction, combined with developments in theories of meaning representation and comprehension control,

resulted in many studies on the teaching of individual strategies. Studies of individual strategy instruction included summarising (Baumann, 1984; A. L. Brown & Day, 1983; Hare & Borchardt, 1984; Taylor, 1982), visualising (Pressley, 1976, 1977), and analysis of fiction in terms of story grammar (Fitzgerald & Spiegel, 1983; Greenewald & Rossing, 1986; Idol, 1987; Short & Ryan, 1984). These studies were successful in improving comprehension of texts, which led to the introduction of single strategy teaching in many basal reading series (Pressley, El-Dinary, & Brown, 1992).

The problem with the single strategy approach, however, was that it mirrored the behaviourist skills approach, and did not fully reflect findings on verbal protocol analyses of expert reading. Expert readers did not use one strategy at a time, but rather sets of strategies which were coordinated and changed as appropriate (Borkowski, Chan, & Muthukrishna, 2000; Dole, Duffy, Roehler, & Pearson, 1991; Duffy, 1993a; Garner, 1988; Paris, Wasik, & Turner, 1991; Pressley, Goodchild, Fleet, Zajchowski, & Evans, 1989). Strategies taught in isolation without either application to real reading tasks, or as part of a co-ordination of approaches to reading, easily became mere skills, only to be used in teacher-set exercises. Thus, teaching strategic procedures in isolation might not necessarily result in durable and general strategy use (Pressley, 1986).

In 1986 and 1989, Pressley and his colleagues synthesised much previous research and posited the characteristics of good strategy users (Pressley, 1986; Pressley, Borkowski, & Schneider, 1989), Such users possessed an extensive knowledge base, were motivated to employ strategies and attributed their success to use of the strategy, made use of metacognitive factors to regulate and monitor comprehension and performance, and were able to analyse reading tasks and plan actions and strategies accordingly. These findings summarised research previously undertaken on

metacognition and motivation, and paved the way for teaching using a coordinated, rather than an atomistic, use of strategies.

Several important studies in the late 1980s to early 2000s explored this possibility further. Instructional programmes such as Reciprocal Teaching, Informed Strategies for Learning, Direct Instruction, and Transactional Strategies Instruction all taught the coordination of multiple strategies.

Teaching the Coordination of Multiple Metacognitive Strategies

Reciprocal Teaching

Focussing on some of the strategies shown through verbal protocol analysis to be most beneficial to expert readers, (question generation, summarising, clarifying any difficulties, and predicting upcoming content), a programme known as 'reciprocal teaching' was developed by Palincsar and Brown (1984). In line with Meichenbaum's (1977) emphasis on the importance of self-control, and Vygotskian theories on scaffolding, teachers led a dialogue about the meaning of a text, gradually relinquishing control to the students (Palincsar, David, Winn, & Stevens, 1991).

Palincsar and Brown's 1984 study on the effectiveness of reciprocal teaching appeared to show significant gains for trained students. They reported on two different studies, the first involving researchers teaching a group of six seventh-grade readers who were average decoders but poor comprehenders. These students were tutored in pairs for approximately 20 days. The performance of these students on a variety of measures (experimenter-developed comprehension tests, summarisation, prediction, and detection of incongruities) was superior to those of three control groups. A second study, identical to the first but involving classroom and remedial teachers rather than researchers, found similar gains for trained students.

In addition, the first of Palincsar and Brown's studies also involved pre- and post-testing students on a standardised reading comprehension measure. The gains noted were large, with four students increasing 15, 17, 20, and 36 months. One of the remaining two students made two months' growth and one had no growth.

However, Carver (1987) criticised these results. There were several deficiencies in Palincsar and Brown's methods which made the standardised reading comprehension gains difficult to interpret. Firstly, there were no comparable data for control students, so the possibility of gains being due to practice effects or maturation could not be ruled out. Secondly, the pre-test data were collected as a group, but the post-test data were collected individually, so gains could have been due to differences in testing conditions. Thirdly, Carver suggests that Palincsar and Brown's study failed to control for time spent reading the assessment test passages, suggesting that results may have been confounded by more time being spent reading post-tests than pre-tests.

A subsequent meta-analysis of 16 reciprocal teaching studies also commented on the lack of conclusive evidence for gains in standardised reading comprehension (Rosenshine & Meister, 1994). Of the 11 studies which did include standardised reading comprehension measures, only two showed significant gains for trained students with a median effect size of .32.

The general approaches adopted in reciprocal teaching have also been critiqued by Pressley (2002a). Pressley argued that, firstly, the use of only four strategies was a limiting factor, as good strategy users employed more strategies than just these. Secondly, he argued that using a limited number of strategies discouraged students' metacognitive control of both the process and of themselves. The assumption of programmed instruction was that with practice students would, during independent reading infer which strategy to employ, and when and where to use it. Pressley and

others have argued that this assumption was not consistent with metacognitive theory, which emphasised the need for teachers to make evident through explicit instruction the way strategies are used flexibly (Duffy, 2002; Jacobs & Paris, 1987; Pressley, 2002a).

Informed Strategies for Learning (ISL)

Another programme to teach multiple strategies was devised at about the same time as Reciprocal Teaching. Informed Strategies for Learning (ISL) was developed as a comprehension strategies instruction package (Jacobs & Paris, 1987). This approach, which can be covered in a single school year, consists of 20 modules targeting research validated strategies, namely, planning for reading, identifying meaning, reasoning while reading, and monitoring comprehension (Adams, Treiman, & Pressley, 1998; Paris & Cross, 1984). ISL incorporated insights from metacognitive theory by emphasising conditional knowledge, as well as teaching approaches modelled on Vygotskian scaffolding. ISL resulted in gains in metacognition and reading strategy awareness, but not in measures of standardised comprehension (Cross & Paris, 1988). A possible reason for the lack of success of ISL was that the limited number of strategies covered did not reflect what expert readers actually do.

Direct Explanation

In Duffy's (1987) 'Direct Explanation' approach, aspects of metacognitive theory and internalised cognitive competence are evident. In an approach designed to be less scripted than either Reciprocal Teaching or ISL, the teacher selects a reading comprehension strategy and an appropriate text based on student needs. The strategies selected for instruction are not preset, but rather chosen from the range of strategies used by expert readers (predicting, monitoring, and summarising for example). The

teacher makes explicit the declarative, conditional, and procedural knowledge about the strategy. At the beginning of the lessons the objective of the lesson should be stated. Information should then be given about why the strategy is being taught, when or where it can be used, what steps are needed to complete it, and how to implement the strategy. The teacher should then mentally model the strategy and include information about when she uses it, giving opportunity for guided practice. Finally, the teacher cues the students to use the strategy appropriately (Gaskins, Anderson, Pressley, Cunicelli, & Satlow, 1993).

For example, when introducing a summarising strategy, Duffy suggests a teacher say something like the following:

> You have all enjoyed sharing favourite books during "Reader's Chair", but sometimes the sharing takes so long that we run out of time, and other students do not get a chance to share. So, today I'm going to show you a strategy you can use to share your books more quickly. When we tell about our books briefly, we are providing a "summary". Instead of telling everything that happened in a story, a summary is a retelling of just the important parts of a story. The secret to making a summary is to think about story parts and to include just that information. Let me show you how I do it, and then we will use some of your books to try it out (Duffy, 2003, pp. 127, 128).

In this example students are explicitly told *what* the strategy is that they will be learning (declarative knowledge), *when* they will use it (conditional knowledge), and *where*. Duffy then proceeds to suggest a way to make evident the procedural knowledge, or *how* to implement the strategy. He does this by giving an example of mental modelling, where the teacher makes evident their own mental processing when following through the steps needed for summarising.

> I have just finished reading this book called *The Wall.* To get ready to share it during "Reader's Chair," I must do some planning so that my sharing does not take too long. To help me do that, I use a story map. A story map is like a picture of the major parts of a story. By using a story map as a guide, I tell only the important things that happened in the story ... Let me show you how I use a story map to make a summary of *The Wall.* First, I look at the beginning to find out who the characters are, where the story is happening, and what the problem is. Right here on the first page, I find out that the characters in the story are a boy and his dad. The story is happening at a wall, and by using my prior knowledge and the clues from the picture, I can predict that it is the Vietnam Memorial. And it says the problem is to find Grandfather's name on the wall. So, now I have the first part of my summary. I can start by saying, 'This is a story of a boy and his dad. They are looking for the grandfather's name on the Vietnam Memorial.' In just two sentences I have summarised the beginning (Duffy, 2003, pp. 128, 129).

As children become increasingly proficient at using the strategy, the teacher gradually diminishes coaching and scaffolds the children, who practise using the strategy. The lesson ends with the teacher reviewing the declarative, conditional, and procedural aspects of the strategy. Motivation to use the strategy is meant to be enhanced as strategies are selected on the basis of difficulties students encounter (Duffy, 2002; Duffy, 2003; Duffy et al., 1987).

Duffy and his colleagues (1987) produced an 'extremely well-designed study' (Adams, Treiman, & Pressley, 1998, p. 324) of the effectiveness of the Direct Explanation approach. In this year-long study they trained 20 randomly assigned third-grade teachers how to make decisions about when and how to explain the mental processing associated with reading strategies. Working only with students in low

reading groups, these teachers were more explicit than control teachers when explaining mental processes. In addition, the students of the treatment group teachers were more aware of lesson content and the need to be strategic, and also scored higher on non-traditional, standardised, and maintenance measures of reading achievement.

There were two non-traditional measures used. The Supplemental Achievement Measures (SAM) were administered to target students on a schedule dictated by the respective teachers' coverage of basal text content. Each student's percentage of correct items was aggregated across all the tests administered during the academic year.

The second of the non-traditional measures, the Graded Oral Reading Paragraph (GORP), involved students reading a paragraph. Their self-corrections during this reading were noted as well as their responses to two embedded words meeting semantic cuing criteria. The treatment group made significantly greater gains than the control group on both of these measures.

Standardised reading was assessed using the Stanford Achievement Test, which consists of two subtests – word study and comprehension. Treatment group students made significant gains on the word study subtest, but not on the comprehension subtest.

The maintenance measure used was the Michigan Educational Assessment Program (MEAP) which is administered in the state of Michigan in October of each year. Students in this study took this test five months after the study to assess maintenance of any achievement growth noted at the end of the study. Students in the treatment group scored significantly higher on the MEAP than those in the control group. These results had a major impact on the reading education community, with Duffy's Direct Explanation model subsequently being used as a basis for the implementation of reading comprehension strategies instruction in a number of schools (Adams, Treiman, & Pressley, 1998).

Transactional Strategies Instruction

In a number of studies linked to Duffy's Direct Explanation, researchers began to study school-based, educator-developed strategies instruction that had a positive impact on students. The aim of these studies was to identify commonalities in practice across various schools which were implementing reading comprehension strategies. Studies were conducted at Benchmark School in Philadelphia, a school specialising in helping children overcome reading problems by implementing the research findings of Duffy, Pressley, Anderson and others (Gaskins, Anderson, Pressley, Cunicelli, & Satlow, 1993; Pressley et al., 1991). These studies were followed by studies in two Maryland public schools where increasing the use of strategies to aid reading comprehension was a focus (R. Brown & Coy-Ogan, 1993; El-Dinary & Schuder, 1993; Pressley et al., 1992).

The practice observed was termed 'Transactional Strategy Instruction' or TSI. Observed instruction showed the following characteristics:

1. Readers are encouraged to construct meaning by using strategies that enable the linking of text content to prior knowledge;
2. Much of the strategies instruction occurs in reading groups, with group members using strategies to construct meaning together. As such, meaning-making is transactional in the sense that the constructed group understanding differs from the personalised interpretations individuals would have generated on their own, especially if they did not use strategies;
3. The teacher's or group members' actions and reactions cannot be anticipated when the reading group uses strategies to construct interpretations. Rather the responses of all members of the group

> (including the teacher) are determined in part by those of others in the group (R. Brown, Pressley, van Meter, & Schuder, 1996).

In sum, the approach used was "more similar to Duffy et al.'s 1987 approach than to any other model" (Adams, Treiman, & Pressley, 1998, p. 326).

Research conducted on a year-long implementation of TSI with low-achieving second-grade readers showed benefits for students. Thirty students (five groups of six) trained in the Students Achieving Independent Learning (SAIL) programme, a programme which contains all the elements of TSI, made significant progress on various standardised and non-standardised measures of reading comprehension, compared to control group students (R. Brown, Pressley, van Meter, & Schuder, 1996). In this study, post-test scores on the Stanford Achievement Test were significantly higher for both the word study subtest and the reading comprehension subtest. In addition, treatment students also made significantly better progress on the number of strategies they reported using, and were significantly more interpretive in their recall of text. This study is of particular interest, as ability-matched control group students were taught by five teachers identified as reading specialists. These teachers blended whole-language practices with elements of skill teaching and other traditional forms of conventional reading instruction. These control groups were, therefore, somewhat akin to New Zealand school classrooms.

Teacher Factors Necessary for Reading Comprehension Instruction

Fundamental to any change in classroom practice is teacher professional development. Research into in-service teacher education has shown some factors that teachers commonly find of greatest benefit. Teachers comment that successful professional development needs to be sustained over a period of time, and needs to

include demonstrations within the teacher's own classroom, coaching, sustained support, and continual pressure to persevere (Guskey, 2002; Hodges, 1996; Hughes, Cahs, Ahwee, & Klinger, 2002). These factors are evident in the training that was given to Duffy's Direct Explanation teachers.

Duffy conducted a five-year teacher training programme involving eight rural school districts in northern Michigan, with the aim of training teachers to improve reading comprehension of at-risk students. This training included monthly sessions about the theory underpinning strategic reading, bi-weekly in-class coaching sessions, and collaborative discussions between principals and teachers in the individual schools (Duffy, 1993a, 1993b).

As well as collecting data on student progress, Duffy also tracked the stages that teachers went through as they became proficient at strategy instruction. He found that teachers progressed through nine stages, which he categorised as follows:

1. Confusion and rejection. Teachers protested that they could not create their own programmes without the aid of a textbook.
2. Teacher controls the strategies. Teachers taught the strategy through asking questions, but did not make the strategy explicit to students through mental modelling.
3. Trying out. Teachers gave declarative and procedural, but not conditional, knowledge about the strategy. Strategies were taught serially with no reference to other strategies or real-world instances of strategy use.
4. Modelling process into content. Teachers became more aware of the need to give students metacognitive control over strategy use. Strategies were related to the text at hand and mental processes were verbally modelled.

5. The wall. Teachers broke away from basal-directed instruction, but resisted embracing the complexity of strategy instruction. Instead they looked for ways to simplify what they were doing and maintain teacher control over instruction.
6. Over the hump. Some teachers moved past 'the wall' and began to see strategies as a means to an end rather than an end in themselves. Teachers at this point used strategies in authentic reading tasks.
7. I don't quite get it yet. Teachers still thought there was only one right way to teach a strategy, and were not ready to experiment depending on the demands of various texts.
8. Creative-inventive. Teachers were no longer baffled by strategies, but revised, invented, or skipped strategies as the needs of the children dictated.
9. Unnamed. This was an unobserved point but left room for point 8 teachers who acknowledged that they had not made it yet but still had room to grow (Duffy, 1993b).

Of concern to Duffy (1993b) was how to train teachers to ensure they reached point 8, the point at which all the relevant theories of what comprises expert reading comprehension coalesce. The 11 teachers that Duffy had intensively tracked suggested that what had helped them the most was conducting teacher education about strategy instruction in the teachers' classrooms, having a long-term focus for professional development, and attending to affective as well as cognitive aspects of teacher development. Teachers wanted professional developers to kindle their motivation, so that they, in turn, could motivate their students.

Other researchers also found that effective professional development in reading comprehension strategies required a multi-faceted approach. In a study of seven

teachers' acceptance of transaction strategies instruction, El-Dinary and Schuder (1993) found that teachers must have a safe, supportive environment in which to learn, and be respected as professionals. They also needed to receive explanations and modelling of what good instruction looks like, and engage in interactive coaching to help them solve instructional difficulties

Becoming a competent teacher of reading comprehension is a time-consuming process. Several studies found that it could take up to three years for a teacher to become proficient in teaching reading strategies (R. Brown & Coy-Ogan, 1993; El-Dinary & Schuder, 1993; Pressley et al., 1992). During this time teachers move from mechanical teaching of the strategies to internalised and personalised instruction (R. Brown & Coy-Ogan, 1993).

Another difficulty in implementing reading comprehension strategy instruction is how to assist the ordinary classroom teacher to do so in a whole-class situation. Almost all studies conducted in reading comprehension strategy instruction have either been with small groups of students (R. Brown & Coy-Ogan, 1993; Duffy et al., 1987; Gaskins, Anderson, Pressley, Cunicelli, & Satlow, 1993; Idol, 1987; Palincsar & Brown, 1984; Pressley, 1976), and/or have been conducted by a researcher rather than the regular classroom teacher (Hare & Borchardt, 1984; Paris & Cross, 1984; Pressley, 1976). However, reading comprehension strategy instruction could benefit *all* students, good and poor readers alike (Andre & Anderson, 1979; A. L. Brown & Smiley, 1978; Gordon & Braun, 1985; Hare & Borchardt, 1984; Langer, 1984). Providing instruction in reading comprehension strategies to the whole class would therefore seem desirable.

In summary, the ideal form of teacher professional development for good reading comprehension strategy instruction requires a long-term focus that includes in-class modelling of teaching techniques, coaching, and instruction in the theory underpinning

the approach. Ideally, this instruction should be given to all students within a classroom, regardless of their reading ability.

Lack of Reading Comprehension Instruction

Despite its proven success, the length of time involved in teacher training may in large measure explain the continued paucity of reading comprehension instruction based on strategy teaching. Despite the concerns Durkin expressed back in the 1970s, subsequent observation of classroom teachers has found that by far the majority of reading comprehension instruction in the United States is still skills-based (Baker, 2002; Pressley, 2002a; Shake & Allington, 1985; Simpson & Nist, 2002). This may be one piece of the puzzle in explaining why one-third of America's children still fail to read proficiently by fourth grade (National Center for Educational Statistics, 2003 cited in McDonald, Morrison, & Petrella, 2004).

Recent studies of reading proficiency and teaching practice in New Zealand yield similar results. The National Educational Monitoring Project found that Year 4 students had stayed at the same level, and the level of Year 8 students had declined slightly over a four year period. This result was attributed to schools possibly giving greater focus to improving oral reading than to improving comprehension (Crooks & Flockton, 2005). Furthermore, the IEA's Trends study conducted in 1990-91 and 2001 ranked New Zealand Year 5 students' ability to comprehend text fourth out of nine countries. While four of the nine participating countries made significant gains in reading comprehension between the two times of testing, New Zealand remained at the same level (Ministry of Education, 2005d).

The teaching of reading comprehension in New Zealand, however, is seen as an important part of two of the major approaches to reading instruction – guided reading

and shared reading. In guided reading the teacher and a small group of students sit together and read and discuss a text of which everyone has a copy. The teacher introduces the text by making links with the students' prior knowledge, and sharing the purpose for reading (Ministry of Education, 2003, 2005b). The 'guided' aspect of the reading then begins as students read a section of text and discuss it with the teacher (Smith & Elley, 1995). These discussions are expected to extend the students' comprehension of the text. At the end of the guided reading session, participants review the purpose for reading and reflect on their learning.

A recent Ministry of Education publication on the teaching of reading entitled *Guided Reading in Years 5-8* (2005) states that "guided reading provides an ideal context in which to teach … comprehension strategies" (p. 53). A number of strategies are listed, including asking questions, inferring, and creating mental images. Advice is given on how to address particular reading difficulties. In each case, where comprehension difficulties are noted, the teacher is advised to question the student. For example, if a student has trouble working out the main idea or point of view in the text, the proposed solution is to "model and encourage relevant questions, for example, 'How could we find out whether …?'" (Ministry of Education, 2005b, p. 62).

A second common approach to the teaching of reading in New Zealand is shared reading. In shared reading, usually practised in the junior school, the teacher sets the purpose for reading and then reads a text aloud to the students. Shared reading is less specifically didactic than guided reading, focussing more on basic concepts about print such as directionality, sound/letter relationships, and vocabulary (Ministry of Education, 2003, 2005b; Smith & Elley, 1995). Comprehension of the story will generally also be discussed in the form of oral questioning by the teacher. This oral approach to the teaching of comprehension also has aspects of strategic teaching of reading

comprehension, as teachers model how they find the answers to comprehension questions.

Students who have been trained using either shared reading or guided reading approaches have shown gains in reading comprehension (Dymock, 1998; Eldredge, Reutzel, & Hollingsworth, 1996). In a study designed to compare the effects of three different methods of improving reading comprehension – text structure instruction, reading practice, and guided reading, Dymock (1998) found that all three methods resulted in significant gains in reading comprehension. The group trained in guided reading did a mixture of guided, shared and independent reading. This group of Year 4-6 students, who were average or above average decoders but average or below average comprehenders, made significant gains in reading comprehension as measured by the Progressive Achievement Test of Reading Comprehension, a standardised multiple-choice test of passages which increase in both length and difficulty. Of interest in Dymock's study is the finding that no one group was superior to any other.

Similarly, Elredge and his colleagues (1996) assessed how the reading comprehension of two groups of randomly assigned second-grade readers changed as a result of either round robin or shared book reading. The round robin group read texts aloud, focussing on correct oral reading. The shared book group had an enlarged book read to them by the teacher who used the story to discuss various concepts about print, as well as discussing the content of the story. Students in the shared book group made significantly better progress than the round robin group on the Iowa Test of Basic Skills, a standardised test which includes an assessment of word analysis, vocabulary, and comprehension.

Shared reading and guided reading include some of the elements of direct instruction. In shared reading, comprehension of the story is discussed orally with

students, whereas guided reading includes focussing on specific strategies for instruction. Explicit instruction adds to the practices of both shared and guided reading by including mental modelling of strategies by the teacher, as well as deliberate efforts to increase motivation to use the strategies by overt teacher modelling of how they, as adults, use the strategies. A focus on the teaching of reading comprehension that includes these elements will add to the existing research data base on the strategy approach to teaching reading.

Conclusion

Research into various aspects of cognitive processing has assisted educators in their knowledge of what reading comprehension comprises. Schema theories emphasised the need for readers to be active in comprehension, either by conscious use of background knowledge, systematic identification of important ideas, or image generation. Studies of metacognition identified the need for awareness and control of particular comprehension strategies. Findings that cognitive processing could be taught through mental modelling showed how reading comprehension strategies could move from being teacher-regulated to student-regulated.

As a consequence of these research findings, knowledge of the teaching of reading comprehension has moved from a static approach to a more dynamic method of instruction involving explicit teaching of a variety of strategies. Research conducted on these methods has shown that students' reading comprehension improved as a result. There remains, however, a lack of reading comprehension instruction that includes the aspects of explicit instruction (i.e. mental modelling of the declarative, procedural, and conditional knowledge associated with strategies) that has been shown to be effective in assisting students to progress in their understanding of text. In addition, those teachers

who have been trained by researchers to implement strategy instruction which includes all aspects of explicit instruction have worked with small groups of low achieving students, rather than whole classes.

Reasons for this lack vary. One possible factor is the absence of teacher training in view of the intensive nature of successful strategy instruction. Another factor is the difficulty of teaching strategies in a standard whole-class situation.

These conclusions led to the following research questions.

- Would reading comprehension strategy instruction result in an improvement in the reading comprehension of students in a Year 4 class, as shown by gains in metacognitive abilities, standardised reading comprehension measures, and reading self-efficacy?
- Can a teacher be trained to successfully implement reading comprehension strategy instruction in a whole class situation by means of intensive tutoring in the theory underpinning reading strategies and the teaching techniques that accompany strategy instruction, researcher modelling, and focus groups where teachers get together to discuss difficulties/successes in implementation?

In addressing these questions, this study makes a unique contribution to the research on the teaching of reading comprehension. While many studies have focussed on the teaching of small groups of struggling readers, this study has a whole-class focus. This focus will enable an assessment of the benefits of reading comprehension instruction to students of varying reading ability. In addition, this study will provide data on the effectiveness of teacher professional development in reading comprehension

instruction, where the classroom teacher, rather than the researcher, is responsible for the implementation of the reading comprehension strategies.

CHAPTER 3

Method and Design

Sample Group Selection Procedures and Characteristics

To answer the two research questions, a quasi-experimental design was used comprising a treatment group, a treatment control group, and a non-treatment control group. Treatment group students received instruction in reading comprehension from a teacher trained to explicitly teach the declarative, procedural, and conditional knowledge about specific strategies in a whole-class situation. Treatment control students received instruction in numeracy strategies from teachers trained to explicitly teach the declarative, procedural, and conditional knowledge about specific numeracy strategies. The treatment control group was included to control for possible placebo effects from receiving an intervention. The non-treatment control group received typical reading instruction including guided reading and shared reading. The teachers of these classes did not receive professional development in either reading comprehension or numeracy.

Sample Selection

Treatment group.

Sixteen teachers volunteered to participate in a one-year reading comprehension strategy course advertised through Massey University, where the researcher was employed as a literacy advisor. The purpose of this course was to train teachers in comprehension strategy instruction so that they might participate in the research during the following year. Of these teachers, for a variety of reasons, only eight completed the year's training. Of these eight, only two would be teaching a group of students the

following year who had not previously received reading comprehension strategy instruction. These two teachers of Year 4 students were invited to participate in the study and consented to do so.

Unfortunately, due to unforeseen family circumstances, one of these teachers had to resign her teaching position at the end of the first school term, nine weeks after the commencement of the study. The remaining teacher, who taught in an adjoining classroom, offered to teach the reading programme in both classrooms throughout the duration of the study so that all student data could continue to be collected. This was agreed to by the researcher.

Treatment control group.

To meet the selection criteria for the treatment control group, teachers needed to be receiving professional development in a core subject other than reading. This professional development needed to be similar in both content (a strategy focus) and approach (similar professional development methods) to that being given to the reading comprehension teachers. The rationale for collecting these data was to ascertain whether an emphasis on cognitive strategies in a content area other than reading would translate into gains in reading comprehension. This controlled for placebo effects, as numeracy, rather than reading comprehension, was taught as a new project in the classroom.

Teachers in the treatment control group were participating in the Numeracy Project (NumP). Commencing in 1998, the NumP project is a national project intended to address the poor mathematics achievement of New Zealand students in the 1997 Third International Mathematics and Science Study (TIMSS) (Higgins, Parsons, & Hyland, 2002). A major focus of NumP is to teach students the cognitive strategies associated with mathematics (Ministry of Education, 2005a). The professional development

method used includes tutoring in the theory underpinning mathematics strategies, and the teaching techniques that accompany strategy instruction, facilitator in-class modelling, and focus groups. The NumP project closely parallels both the theory and the professional development approach adopted in the reading comprehension strategy instruction that was the focus of this study.

To select participants for the treatment control group, a list of all schools participating in NumP was obtained from a Numeracy Project advisor. From these, a school similar to the treatment group school was identified. A North Island school was chosen which matched the treatment group's school size (approximately 400 students), and was in the first year of NumP at the Year 4 level. In addition, the school matched the treatment school's decile ranking (10), a measure of the socio-economic communities from which a school draws its students, with 1 being the lowest and 10 being the highest. This school was invited to participate in the study, and consented to do so.

The professional development that these Year 4 NumP classes received included six workshops focussed on the theory underpinning the programme, practical activities for teachers to use in classrooms, and questioning techniques. In addition, NumP facilitators demonstrated four classroom lessons and observed teachers teaching one lesson. All these elements were also present in the reading comprehension strategy professional development. However, the reading comprehension strategy training included many more in-class demonstrations (14) and observations (14). Also, the NumP project was in its first year of implementation, whereas the reading comprehension strategy training was in its second year. The treatment group had also received NumP training, but were in the third year of the programme. Professional

development for the treatment group teacher at this stage of the programme only involved attendance at staff meetings (one per term) where the project was discussed.

Non-treatment control group.

To meet the selection criteria for a non-treatment control group, a school was identified where teachers did not wish to receive and had not received professional development in reading comprehension strategy instruction, or strategy instruction in any other subject. Children in this group were included to compare the reading comprehension abilities of students who had not received training in cognitive strategies with those who had.

The non-treatment control group participants were selected from a school that matched the treatment group in decile ranking and school size, but was neither receiving professional development in reading comprehension strategy instruction, nor participating in the Numeracy Project. To select this school, information was obtained as to which schools had participated in neither the reading comprehension nor numeracy programmes. One school was identified and invited to participate in the study and consented to do so.

Ethical Considerations

Ethical approval for this present study was granted by the Massey University Human Ethics Committee on October 11 2004 (Reference HEC 04/140). The accompanying documentation outlined the nature of the study, and made it clear that participation was voluntary, and anonymity was assured. Letters outlining the research, and inviting teachers and students to participate, were sent to all schools involved in the research. In addition, letters were sent to school principals, board of trustees'

chairpersons, and parents of all students. Written consent confirming willingness to participate, and acknowledging transparency and understanding of the intentions of the present study, was gained from every participant.

Sample Characteristics of the Students

One hundred and fifty Year 4 students (74 male and 76 female) from eight classrooms in three suburban primary schools located in three North Island provincial cities participated in the study. These students were taught by eight teachers, one of whom also took part in the study. Five of the eight classrooms were composite Year 3 and 4 classes.

The treatment group consisted of 48 Year 4 students (24 male and 24 female) aged between 7 years 9 months and 8 years 11 months at the time of first testing. These students came from two different classrooms in the same school. At the beginning of the school year one of the classes had a total of 30 students and the other 29. The latter class was a composite Year 3 and 4 class, with nine of the students being at the Year 3 level. None of the Year 3 students was included in the sample, although they did participate in all of the reading comprehension lessons being taught in the classroom. Two students who left the school during the year were excluded from the sample.

The treatment control group consisted of 61 students (31 male and 30 female) aged between 7 years 10 months and 9 years at the time of first testing. These students came from three Year 4 classes within one school. At the beginning of the year, two of these classes had 26 students, and one had 21, providing a total of 73 students. Of these, three students left the school during the year and a further nine either did not return signed consent forms, or did not grant their permission to participate.

The non-treatment control group consisted of 41 students (19 male and 22 female) aged between 7 years 6 months and 8 years 10 months at the time of first testing. These students were from four Year 3 and Year 4 composite classes within one school. At the beginning of the year one class had 13 Year 3 and 14 Year 4 students, the second had 16 Year 3 students and 11 Year 4 students, a third had 15 Year 3s and 12 Year 4s and the fourth had 14 Year 3s and 13 Year 4s giving a grand total of 50 Year 4 students. Of these, one student was not included in the sample as he was classified as having special needs, and one student left the school during the year. A further seven students either did not return signed consent forms, or did not grant their permission to participate. None of the Year 3 students were included in the sample, as the small number of Year 3 students in the treatment group had also been excluded from data collection.

Table 1 presents sample sizes and age characteristics for each group. A one-way ANOVA test showed a significant effect for age, $F(2,149) = 9.52, p<.01$. This was due to the treatment control group students being older than students in the other two schools. However, as this difference represents about two months, it is unlikely to be educationally significant. The mean age for the three samples (treatment group, treatment control group, and non-treatment control group) was 99.55 months or approximately 8 years and 4 months.

Table 1

Gender Distribution and Ages (in months) of Sample Groups

	Male	Female	Mean age	SD
Treatment group	24	24	98.83	3.00
Treatment control group	31	30	101.02	3.74
Non-treatment control group	19	22	98.20	3.61

N = 150

A one-way ANOVA on socio-economic status, based on fathers' occupations as classified according to the Elley-Irvine Socio-economic Index (Elley & Irving, 2003) showed no significant differences $F(1,119) = 0.58$, $p = .56$. This index measures socio-economic level on a 1-6 scale with one representing professional workers (e.g. accountants) and six representing unskilled occupations (e.g. sawmill labourers). Here, treatment group students had a mean rank of 2.3 (SD = 1.2), treatment control group students a mean rank of 2.5 (SD = 1.3) and non-treatment control students had a mean rank of 2.5 (SD = 1.2). These rankings suggest that the three groups were drawn from similar, predominantly professional, socio-economic backgrounds.

Finally, the majority of the students were European (96% of the treatment group, 90% of the treatment control group and 68% of the non-treatment control group). The remaining students were either Maori (2% of the treatment group, 8% of the treatment control group and 17% of the non-treatment control group), Asian (2% of the treatment group, 2% of the treatment control group and 13% of the non-treatment control group) or Indian (2% of the non-treatment control group) (See Table 2). While the treatment

and treatment control groups had a similar ethnic composition, the non-treatment control school had a much greater degree of ethnic diversity.

Table 2

Ethnicity Distribution of Sample Groups

	Treatment group %	Treatment control group %	Non-treatment control group %
European	96	90	68
Maori	2	8	17
Asian	2	2	13
Indian	0	0	2

N = 150

In sum, the treatment group students in this study appear to be similar to the two control groups in age, and socio-economic status, but not in terms of ethnicity.

Sample Characteristics of the Teachers

As noted above, the students in the sample were taught by eight teachers. These teachers varied in the number of years of teaching experience, and the number of hours they engaged in teaching timetabled reading each week.

The treatment group teacher had taught for a total of 23 years and engaged in 5 hours per week teaching timetabled reading. Four of those hours (Monday – Thursday) were spent teaching reading comprehension strategies exclusively. The final hour (Friday) was spent doing general reading activities such as sharing poetry and listening to stories. Experienced teachers also taught the treatment control (numeracy) classes, with one teacher having taught for 20 years, one for over 20 years and one for 15 years.

Treatment control teachers also engaged in five timetabled hours per week teaching reading. In the four non-treatment control classes, two of the teachers had not had many years of teaching experience (2 years and 5 years), while the remaining two were experienced (15 years and 20+ years). These teachers spent three to four hours per week teaching timetabled reading. The timetabled reading time for both control groups was spent teaching age-appropriate skills and reading graded material in ability groups. This information is summarised in Table 3.

Table 3

Years of Teaching Experience and Number of Hours Spent Teaching Timetabled Reading per Week

	Treatment group		Treatment control group		Non-treatment control group	
	Years experience	No. of hours spent teaching reading	Years experience	No. of hours spent teaching reading	Years experience	No. of hours spent teaching reading
Teacher 1	23	5	15	5	2	3-4
Teacher 2			20	5	5	3-4
Teacher 3			20+	5	15	3-4
Teacher 4					20	3-4

Student Measures

To test whether strategy instruction would result in an improvement in the reading comprehension of students, measures were taken to assess gains in metacognitive abilities, word-decoding, standardised reading comprehension, and reading self-efficacy.

Metacognitive Awareness

The measurement of metacognition is a fraught process, as instruments need to capture the regulation of thinking processes (Baker & Cerro, 2000; Borkowski, Chan, & Muthukrishna, 2000; Paris & Winograd, 1990; Pintrich, Wolters, & Baxter, 2000; Pressley, Forrest-Pressley, Elliott-Faust, & Millar, 1985). There are a number of suggested ways to measure metacognition. These include interviewing students individually about the strategies they use, asking students to think aloud while they read, and analysing oral reading (Baker, 2002). The disadvantages of these methods are that they are somewhat subjective, and also very time consuming.

In an effort to address these difficulties, several paper and pencil tests have been developed, notably the Metacomprehension Strategy Index (Schmitt, 1990), and Index of Reading Awareness (Jacobs & Paris, 1987). These have also been criticised due to difficulties in capturing cognitive processing with a self-report instrument, writing plausible distracters in a multi-choice test, and suggesting that there is a correct way to use a strategy (Baker, 2002; McLain, Gridley, & McIntosh, 1991; Pintrich, Wolters, & Baxter, 2000).

Exhaustive efforts were made to identify a suitable measure of metacognition, including an examination of relevant research reports, and consultation with experts in the field. A multiple-choice Index of Reading Awareness (IRA) constructed by Jacobs

and Paris (1987) was identified as the most suitable measure for this study. The IRA was designed to meet four criteria. Firstly it was designed to be more objective than interviews, which necessitate open-ended answers, and can give rise to experimenter bias or fabricated responses. Secondly, the test is based on empirical research of children's responses to metacognitive questions, reflecting their knowledge of reading comprehension strategies rather than the tester's beliefs about what they know. Thirdly, being a multiple-choice measure, it is easy to administer and score. Finally, the test is designed to be sensitive to individual and age-related differences in awareness about reading. This last criterion was especially germane to this study, as the IRA was originally constructed for students of the same age as those in the current study.

The IRA contains 20 multiple choice items relating to children's reading awareness in four metacognitive areas (evaluation, planning, regulation, and conditional knowledge). A complete copy of the IRA is included as Appendix L. Examples of questions from each of the respective subscales follow:

What is the hardest part about reading for you?

a. Sounding out the hard words.

b. When you don't understand the story.

c. Nothing is hard about reading for you.

When you tell other people about what you read, what do you tell them?

a. What happened in the story.

b. The number of pages in the book.

c. Who the characters are.

What do you do if you come to a word and you don't know what it means?

a. Use the words around it to figure it out.

b. Ask someone else.

c. Go on to the next word.

If you are reading a library book to write a book report, which would help you the most?

a. Sound out words you don't know.

b. Write it down in your own words.

c. Skip the parts you don't understand.

Each metacognitive area contains five items. Each item has three alternatives representing an inappropriate response (0 points), a partially adequate answer (1 point), and a strategic response (2 points). The order of the choices is randomised.

The IRA was constructed for use with children in the third and fifth grades (New Zealand Years 4 and 6) with grade-equivalent reading abilities from second to seventh grade. Items are read aloud at all levels. Metacognitive awareness scores derived from the IRA may range from 0 (low metacognitive awareness) to 40 (high metacognitive awareness). Technical data for the IRA (Jacobs & Paris, 1987) reveals a test-retest correlation of .55, after an 8-month interval (n = 544). No ceiling or floor effects were found and no items were unusually skewed. The standard deviation for items ranged between .49 and .89. The above data suggest that the IRA is a relatively reliable and a stable instrument over time.

Reading Comprehension

Reading comprehension was assessed using the Progressive Achievement Test of Reading Comprehension (PAT Reading Comprehension) (Reid & Elley, 1991), Form A. The test results include age equivalent and percentile rankings, as well as raw scores. As the measure was used as a pre-post assessment of reading comprehension, only raw

scores were recorded, percentile rankings being standardised for the month of March only.

The PAT Reading Comprehension forms part of a series of standardised tests developed specifically for New Zealand school children. The tests are designed to be administered early in the school year to assist teachers in designing appropriate programmes for their students, and are divided into two forms (A and B) to be used in alternate years. The various parts of the test (Part 2 to Part 8) correspond to the New Zealand year levels 4 to 10. The Part 2 Form A test of reading comprehension was used in this study.

Both factual and inferential comprehension of prose material is measured by the PAT Reading Comprehension. Factual items test the ability to locate facts, to follow directions, and to note sequences of events as stated in the selection read. For example, after reading a story about a dog named Duke who mistakes his reflection for another dog, the following question is asked at the Part 2 level:

Where was Duke going in this story?

(a) Searching for his master.

(b) Looking for a way to cross the stream.

(c) Heading for home.

(d) Looking for another dog

To answer this factual question, students need to refer back to the passage, which states, "One day Duke found a piece of meat and was carrying it home in his mouth to eat."

Inferential items require the student to determine the author's intention, mood, or point of view, to establish the main point of a passage, to relate general themes to supporting details, to distinguish between fact and opinion, to draw conclusions about

people and events described, and to predict future events which could be inferred from the passage read. For example, for the passage cited above students are asked:

How do you think Duke felt at the end of the story?

(a) Foolish at his mistake.

(b) Happy to get safely home again.

(c) Sorry that the other dog got his meat.

(d) Glad that he had got across the stream.

To answer this question, students have to draw conclusions about Duke and the events described.

The entire test comprises eight prose passages of 100 to 300 words followed by five or six multiple-choice items, each with four or five options. These selections are either narrative (four passages), descriptive (three passages), or expository (one passage). The proportion of factual to inferential items is approximately 50:50 at the Year 4 level. There are 45 questions in total.

The PAT Reading Comprehension has been tested for both reliability and validity. For the Part 2 Form A test, the Kuder Richardson 20 coefficient of reliability is reported as .88, showing a good level of internal consistency. When compared to other measures of reading comprehension, the PAT Reading Comprehension correlated strongly with the Iowa Tests of Basic Skills Comprehension Level 11 (r = .82) providing evidence in support of concurrent validity (Reid & Elley, 1991). As the PAT Reading Comprehension was judged to be a sound measure, and owing to limited time available for testing, it was selected as the only measure of reading comprehension.

Word Decoding

As the ability to decode is part of the formula for reading under the simple view of reading: R = D x C (reading is a function of decoding and comprehension: Gough & Juel, 1991), students' ability to decode was assessed using the Pseudoword Naming Task (PNT) (Richardson & Di Benedetto, 1985). In this test, 60 nonsense words that follow the standard patterns of English words are read aloud by individual students. Items are presented in order of increasing difficulty, ranging from simple consonant-vowel-consonant patterns (e.g. *jit, med, dut*) to blends, digraphs, and vowel variations (e.g. *prew, thrain, delephote, cooster, enfroider*). The internal reliability for the Richardson and Di Benedetto (1985) test is 0.99. Scoring was based on the number of items pronounced correctly.

Reading self-efficacy

As self-efficacy is situation specific (Bong & Clark, 1999), the researcher devised a test to measure this construct. This test was modelled on self-efficacy measures developed in other fields.

The instrument consisted of eight numeracy items and 12 literacy items, balanced to minimise response acquiescence. The scale, which ranged from 0 (can't do it) to 3 (very sure) for each item, was designed to measure the students' confidence to perform specific literacy and numeracy tasks. The scale used language that could be easily understood by 8 and 9-year-old children and contained four choices to prevent students choosing a middle response. Potential scores ranged from 0 (low self-efficacy) to 36 (high self-efficacy) for literacy and 0 to 24 for numeracy.

The items were developed around the strength of expectation that children could perform certain tasks. Aspects of literacy that the test was designed to measure included

confidence in activation of prior knowledge (item 1), summarisation (items 3 and 16), finding the main idea (items 4 and 18), prediction (items 6 and 9), using parts of a book such as the index and headings (items 7 and 17), using diagrams (item 8), imagery (item 11), and decoding (item 20). As an example of the wording used, one of the literacy items was "How sure are you that you can write a few sentences about a story you have read that would tell someone else what the book was mainly about?" (item 3).

The eight numeracy items were adapted from Part B of the 2004 Numeracy Project diagnostic interview, a form used by teachers involved in the Numeracy Project to obtain information about students' content and strategy knowledge of mathematics (Ministry of Education, 2005a). Part B of the diagnostic interview was chosen as it represented the fourth and fifth stages of the number framework, the levels at which most Year 4 students should be functioning.

Aspects of the Numeracy Project diagnostic interview included in the self-efficacy measure were forwards number word sequence (item 2), backwards number word sequence (item 15), multiplication (item 5), fractional numbers (item 13), place values (item 14), basic facts (items 10 and 12), and proportions and ratios (item 19). The diagnostic interview is conducted individually with students so that teachers gain understanding of the student's mathematical thinking. As the self-efficacy measure was to be a paper and pencil test, questions were reworded accordingly. For example, for a Numeracy Project question on place values, the teacher says "A toy costs $80. How many $10 notes do you need to pay for it?" The corresponding self-efficacy item asks "How sure are you that you could work out how many 10 dollar notes you will need to buy a toy that costs 60 dollars?" A copy of the self-efficacy questionnaire is included as Appendix M.

The test was piloted with six Year 4 children, selected by their teacher to represent a range of reading ability. The test was conducted in a classroom where only the six children were present and each item was read aloud by the researcher. The children were instructed to ask for clarification if they were unable to understand either the test directions or the wording of the individual items.

During the test only one item contained a word that the students did not understand (the word *diagram* in item 8) therefore the word *drawing* was added to this item. All instructions were clearly understood. Scores for literacy self-efficacy ranged from 14 to 30, with a mean of 19 and a standard deviation of 5.9. For numeracy, scores ranged from 6 to 20 with a mean of 17.1 and a standard deviation of 5.3. The test was thus considered not to have ceiling effects.

Treatment Group Teacher Training

Reading Comprehension Strategy Instruction Course (2004)

As mentioned above, to meet the criteria for treatment group selection, teachers had to have received a year's instruction in the teaching of reading comprehension strategies. This instruction was provided by the researcher during the four school terms of 2004. Sixteen teachers enrolled in the course, which was advertised through Massey University where the researcher worked as a literacy advisor. Of these 16, one was a support teacher, and one was working in school management and did not have classroom responsibilities. These two teachers withdrew at the end of the first term. Other teachers withdrew at the beginning of the second term due to work pressures, leaving a total of eight teachers who completed the year's training.

The course was structured, in line with practices adopted in Duffy's research (1993a, 1993b) to include a combination of both theoretical and practical elements.

During the first term, teachers attended four two-hour workshops after school in four successive weeks. Theoretical elements were presented by the researcher in lecture form based on research that had been conducted in the field of reading comprehension instruction. Practical elements were largely based on observations that the researcher had conducted during her three months at Benchmark School in Philadelphia. Although many principles of teaching were gleaned from these practical sessions, considerable adaptations were made in order to address differences between the two contexts. Benchmark's class sizes of 12 with one main teacher and two assistants contrasted markedly with the 25-30 mixed-ability students with one teacher in the New Zealand setting. In addition, the strategy focus at Benchmark was incorporated into all subjects, whereas this study focussed only on reading comprehension strategy instruction.

Workshop 1.

The first workshop covered the historical move from skill-based teaching of reading comprehension to a strategy focus. The theory underpinning a strategy approach to reading comprehension was discussed in relation to schema theory, cognitive strategies and metacognition.

In order to understand the impact of a behaviouristic skills approach on the teaching of reading comprehension, teachers viewed samples of skill-focussed reading comprehension sheets that had been photocopied from reading manuals from the 1960s. The shift to a strategy focus was then discussed, initially, in relation to schema theory.

Schema theory was defined (in relation to reading comprehension) as

> [How] schemata, or knowledge already stored in memory, function in the process of interpreting new information and allowing it to enter and become a part of the knowledge store … To say that one has comprehended a text is to say

> that she has found a mental 'home' for the information in the text, or else that she has modified an existing mental home in order to accommodate that new information. (Anderson & Pearson, 1984, p. 255)

Teachers then related a diagram of a ship christening (taken from Anderson and Pearson, 1984) to a newspaper article on a ship christening, and noted how schema theory was evident in the processes they used to answer inferential questions on the passage. Teachers also read texts deliberately written to be obscure (*Rocky* (Anderson, Reynolds, Schallert, & Goetz, 1977) and *Washing Clothes* (Bransford & Johnson, 1973)) to discover the impact of an initially chosen schema on subsequent inferencing. Applications of schema theory to the teaching of reading comprehension, such as the need to build background knowledge prior to reading and the need to show poor readers the interrelationships among ideas in a text to help them with inferencing, were then discussed.

Cognitive strategies were introduced (in contrast to passive, skills-based reading) as an aspect of active reading, as defined by Adler and van Doren (1972), who likened the reading process to a game of baseball. In order to successfully catch whatever type of ball (text) the pitcher (author) sends, the backstop (reader) needs a variety of strategies. Strategies (deliberate plans) were contrasted with skills (automatic processes), and then applied to the reading process.

In order to gain understanding of how the use of cognitive strategies impacts on reading comprehension, teachers were shown transcripts of verbal protocol analyses of readers who used either minimal, moderate, or advanced strategies when reading a text (Pearson, 1985). A list of reading comprehension strategies adapted from those taught at Benchmark School in Philadelphia was then handed out and discussed. These included summarising fiction, summarising non-fiction, character analysis, identifying the theme

and the author's message, and teaching a combination of strategies. Each strategy also had teaching notes on how to include declarative knowledge (what was being taught), procedural knowledge (how to use the strategy), and conditional knowledge (when and why to use the strategy). These strategies were chosen for initial discussion, as they had been used extensively by Benchmark School, who had identified them as key to understanding various text genres. In addition, a number of the strategies were combinations of smaller strategies. For example, summarising non-fiction included surveying the text, activating background knowledge, predicting what the text would be about, having a question to research, setting a purpose based on that question, reading, discussing, and taking notes, and identifying interesting vocabulary. By considering these broad strategies, teachers gained an appreciation for the combination of strategies needed to understand text (Adams, Treiman, & Pressley, 1998).

The final theoretical aspect covered in the first session was the influence of metacognition on the teaching of reading comprehension strategies. Metacognition was defined as "... an awareness of our own cognitive processes (thinking and learning activities) or knowing about what we know. Further, metacognition refers to strategic regulation of our own cognitive processes" (Gordon & Braun, 1985, p. 2).

Once again, particular metacognitive strategies that applied to reading were discussed. These included clarifying the purpose for reading, identifying the important aspects of a message, focussing attention on major content rather than trivia, and monitoring ongoing activities to determine whether comprehension is occurring (Gaskins & Elliot, 1991). The importance of the metacognitive processes in helping students take control of task, person, strategy, and environmental variables was stressed.

To conclude the first session, teachers were advised to read Chapter 6 of Gaskins and Elliot's (1991) book *Implementing Cognitive Strategy Training across the School.*

This chapter told a story of two teachers who taught social studies to junior high school students. The chapter detailed how they taught both content and reading strategies within a particular topic. Teachers were asked to read this chapter, and to note instances where schema theory, cognitive strategies, and metacognitive strategies were evident in the lessons described. Teachers were made aware that their findings from the reading would form the basis of the opening discussion at the following week's workshop.

Workshop 2.

The second workshop began with a discussion of the previous week's recommended reading. The researcher noted that teachers were able to identify the aspects of schema theory, cognitive strategies, and metacognitive strategies that were mentioned in the chapter, indicating an initial understanding of these concepts. Implications from findings in motivational research were then discussed, followed by information on specific teaching techniques to aid reading comprehension strategy instruction – scaffolding and explicit instruction.

Student motivation was considered from the perspective of attribution research (Borkowski, Chan, & Muthukrishna, 2000). Teachers viewed a table that listed the common factors (ability, effort, attitude, physical factors, task difficulty, assistance from others, luck) to which students attribute their success or failure at school. These factors were discussed in terms of internal and controllable factors (effort, attitude, and physical factors), and external and uncontrollable factors (ability, task difficulty, assistance from others, and luck). Attribution research was then linked to reading strategy instruction as the declarative, procedural, and conditional knowledge given about a strategy motivates students to expend more effort (a controllable factor), since procedural knowledge

provides the information on *how* to do so, thus enhancing the students' motivation to use the strategies.

Teaching approaches to enhance strategy instruction were then detailed. Firstly, scaffolding was defined as

> ...explaining, demonstrating, and jointly constructing an idealised version of a performance. Scaffolding includes recruiting the students' interest, reducing the number of steps so that the task is manageable, maintaining students' persistence toward the goal, making critical features evident, and controlling frustration and risk. (Gaskins et al., 1997, p. 47)

The purpose for scaffolding, namely, to move from teacher to student ownership, was then discussed (Duffy, 2003), along with levels of scaffolding. Teachers were given a handout based on the approach adopted at Benchmark School in Philadelphia, which showed five levels of scaffolding ranging from total teacher support to no teacher support. These were as follows:

1. Much teacher support: While the teacher performs the task, students are encouraged to participate in the completion of the task.
2. Moderate teacher support: Teacher identifies elements of the task while the students complete the task.
3. Occasional teacher support: Teacher cues aspects of the task when necessary.
4. Minimal teacher support: Teacher identifies task, students implement.
5. No teacher support: Students identify task and implement.

It was made clear to teachers that for strategy instruction to be effective there should be a transition from much teacher support to minimal or no teacher support.

The hallmarks of explicit teaching were then discussed, namely:

1. The strategy is modelled, practised and applied to the whole comprehension task.
2. The strategy is modelled in a variety of ways with different tasks.
3. The adaptability and flexibility of strategies is emphasised (Dole, Duffy, Roehler, & Pearson, 1991).

Teachers were then set the task of participating in a modelled lesson where the researcher taught a non-fiction reading strategy lesson using a reading by Duffy (2002). The modelled lesson included declarative, procedural, and conditional knowledge on the use of the strategy, as well as explicit teaching on how to summarise the reading in order to remember its content. Teachers had to both participate in the lesson and take notes on how the researcher had included components from research on schema theory and motivation in her teaching approach. They also had to reflect on how the strategies had been taught, how metacognition had been incorporated, and which level of scaffolding had been used. Teachers discussed these various aspects at the conclusion of the modelled lesson. The remainder of the reading, which covered the need for direct explanation of reading strategies, was then set as work to be read and summarised in order to form the basis of the opening discussion in the following workshop.

Workshop 3.

The third workshop began with a discussion of the previous workshop's reading. As Durkin's (1978) research on the paucity of reading comprehension instruction in the United States was mentioned in the reading, brief information on Durkin's research was given. More recent research that indicated an ongoing lack of instruction in reading comprehension was also discussed (Pressley, 2002a; Simpson & Nist, 2002). These studies detailed observations in a number of classrooms in the United States, where a

lack of reading comprehension instruction was noted. Material covered at the previous workshop, regarding teaching techniques for successful reading comprehension instruction, was then continued, with further information on explicit teaching also being given.

Explicit teaching was first covered in terms of the student factors necessary for school success. Teachers were provided with material adapted from the Benchmark School *2003 Staff Inservice Folder* which detailed the characteristics that were necessary for students to exhibit if they were to experience success at school. These included being attentive, active, reflective, adaptable, and persistent. Some of the teaching methods used at Benchmark School to encourage these characteristics – for example, setting individual behavioural goals with students and singing motivational songs – were then discussed and applied to methods for acquiring reading comprehension strategies.

Teacher factors necessary for explicit instruction were then explained in terms of teacher dialogue, questioning, pacing, and encouraging every pupil response. The type of dialogue that best facilitates explicit instruction was adapted from a reading by Gaskins et al. (1993), where the ideal teaching moves in an explicit teaching lesson are detailed. Teachers should begin by stating the objective of the lesson and then presenting information about why the strategy is being taught, when or where it can be used, what steps are needed to complete it, and how to implement the strategy. The teacher then mentally models the strategy and includes information about when she uses the strategy, giving opportunity for guided practice. Finally, the teacher cues the students to use the strategy appropriately. This outline was discussed in relation to the modelled lesson in which the teachers had participated the previous week.

In order to illustrate principles about lesson pacing, anecdotes from Benchmark School in 2003 were once again used (Gaskins & Elliot, 1991). These anecdotes suggested that teachers should keep lessons lively, with abundant opportunities for teacher/student interaction. Varying activities was also considered a good way to maintain student interest.

Techniques to encourage every pupil to respond during a strategy lesson were also adopted from those suggested in Gaskin and Elliot's book about Benchmark School (Gaskins & Elliot, 1991). Examples of how this might be done included requiring students to complete a response sheet, asking every student to write an answer to teacher questions, and systematically calling on every child in the class rather than focussing only on those who raise their hands in response to questions.

In order to observe these teaching techniques in action, teachers concluded the workshop by viewing a videoed reading strategy lesson which the researcher had taken while at Benchmark School. Teachers first viewed copies of the videoed teacher's lesson plan and discussed the extent to which it included motivational and explicit teaching. They then viewed the video in sections, watching particularly for the questioning techniques used, the application of schema theory, the motivational techniques and level of scaffolding used, and how the strategy was incorporated into the lesson.

Teachers were advised to read chapter 5 from Almasi's (2003) book *Teaching Strategic Processes in Reading*. This chapter, which was to be discussed at the following week's workshop, covered relevant background research on the teaching of reading comprehension strategies, as well as providing hands-on tools and resources to aid beginning strategy instruction.

This reading was recommended to reinforce the explicit teaching techniques that had been explained and viewed in the workshop as well as providing information on strategies which overlapped with those taught at Benchmark School, which had been circulated at the first workshop. Strategies in the Almasi reading included previewing text (included as part of the summarising non-fiction strategy, and identifying the theme and author's message in Benchmark School's *2003 Staff Inservice Folder*), activating prior knowledge (also included as part of summarising non-fiction, character analysis, and identifying the theme and author's message), setting purposes (included as part of summarising non-fiction), generating, verifying, and updating predictions (included in summarising non-fiction), identifying text structure (included in summarising fiction, and summarising non-fiction), and comprehension monitoring (included as part of all Benchmark strategies). By focussing on some of the smaller components of the more global Benchmark strategies, teachers were enabled to have a less encumbered beginning to strategy teaching.

Teachers were also required to use the reading to help them select a strategy to teach to their class, or to a group within their class. The reading gave information on how to observe students in order to discern what their comprehension needs were. In addition, a selection of lesson plans for each strategy was included. As the aim of the workshops was to teach reading strategies based on student needs, teachers were asked to select either a group in the class with a specific need, or teach a strategy to the whole class if they perceived the need to be more global. They were asked to be prepared for the next session by selecting a strategy and a text in order to begin planning a strategy lesson.

Workshop 4.

The final introductory workshop provided information on discussion technique, introduced various reading comprehension assessment methods, and gave opportunity for assistance with planning of the initial reading comprehension lessons.

A rationale for including class discussion as a part of reading comprehension strategy instruction was first discussed. Reasons that were given included providing numerous opportunities to foster critical thinking in students, helping to alleviate students' feelings of isolation, and encouraging active participation by all (Alvermann, Dillon, & O'Brien, 1987). Teachers were shown which elements to consider when planning a discussion. A videotaped example of a class discussion about a text, taken by the researcher during her three month stay at Benchmark School in 2003, was then shown. Teachers viewed and critiqued the lesson.

Teachers were then introduced to several measures of reading comprehension. The Metacomprehension Strategy Index (Schmitt, 1990), and Index of Reading Awareness (Jacobs & Paris, 1987) were both provided for teachers to trial, though warnings were given as to the limitations of self-report measures. Teachers were also provided with some training on the TORCH (Test of Reading CompreHension), a well-regarded Australian test which has been trialled in various parts of New Zealand (Burgon, 1988; Hughson, 1996; Lamont, 1995). In addition, Duffy's list of informal teacher observations to assist with selection of particular strategies to teach was discussed (Duffy, 2003). A short self-efficacy test, which had been devised by the researcher, was suggested as a measure of reading motivation.

The workshop concluded with a discussion of the reading set during the previous week, and the setting of a timetable for classroom visits for the following term. Teachers indicated to the researcher which time in the week was most suitable for a

classroom visit where the researcher could initially model, in the teacher's own class, the strategy that the teacher had chosen. Teachers chose a time where they could be free to observe the lesson, and where they had a 15 minute time slot at the end of the lesson in which they could discuss what they had observed.

A final reading, chapter 7 from Almasi's (2003) book *Teaching Strategic Processes in Reading* was recommended as preparation for teaching. This chapter detailed the various difficulties Almasi's students had encountered as they attempted to implement strategy instruction in their classes. The reading was recommended to teachers as an encouragement to them to persevere, realising that they could expect to encounter some problems.

Classroom Work

During the third and fourth terms, teachers observed the researcher model lessons in their classrooms, were coached as they taught lessons, and attended professional development workshops.

Terms 2 and 3, 2004.

As arranged in the final workshop of the first term, the researcher visited each classroom once a week in the second term and initially modelled a half hour strategy lesson while the teacher observed. A specific observation task form was given to each teacher. This form was designed to focus the teacher's attention on specific aspects of teacher and student talk that facilitated the reading strategy approach (see Appendix A). The teacher then met with the researcher for 15 minutes after the modelled lesson to consider what had been observed, discuss what would be taught in the coming week, and plan what the researcher would model during the next lesson. After about eight

lessons had been observed, most teachers were willing to teach a lesson while the researcher observed and coached. The strategies the teachers trialled included surveying, predicting and setting a purpose for reading, how to discern character traits in fiction, activating prior knowledge, summarising fiction, summarising non-fiction, and comprehension monitoring. Of these, the teacher from whose class data were collected in the following year taught comprehension monitoring, activating prior knowledge, vocabulary introduction, and note-taking (the latter two strategies being aspects of summarising non-fiction). Sample lesson plans taught by the researcher for each of these strategies are included as Appendices B to E respectively.

In addition to the in-class modelling and coaching during the second term, teachers also met twice as a group. The first meeting was to allow teachers to discuss which strategies they were trialling and the successes or difficulties they were experiencing. Teachers most often mentioned difficulties with mental modelling. They were advised that this was also identified as a major difficulty in the Almasi (2003) chapter they had been recommended to read in the final workshop in term one. By sharing their experiences in the group, teachers were able to encourage and help one another.

At this meeting teachers also discussed their perceptions of the various assessment measures they had trialled. The consensus was that both the IRA and the MSI provided valuable information on the knowledge students had about reading comprehension strategies. Both tests were also judged to be relatively easy to administer. The TORCH test, however, was not favoured by teachers. Difficulties included problems with assigning the students the right test in the first instance, (tests are graded by student ability rather than year level), as well as problems with marking and interpreting scores.

During the second meeting, only those teachers who had trialled non-fiction strategies reported back to the group. Teachers had noted growth in students'

knowledge about the chosen topic, as well as awareness of some of the strategies (e.g. predicting and comprehension monitoring). However, difficulties in scaffolding instruction and in mentally modelling strategies were still mentioned.

The researcher spent the remainder of this meeting providing information on how to teach non-fiction strategies, which was to be the focus for all teachers in the third term. This included a rationale for focussing on non-fiction texts, (it is a neglected area in reading instruction (Ogle & Blachowicz, 2002)), and how to teach particular strategies to help children understand the non-fiction texts they were reading. These strategies included pre-reading strategies: vocabulary exercises, graphic organisers, surveying the text, activating background knowledge, and posing questions about the text; during-reading strategies: verbal rehearsal, written rehearsal, drawing diagrams, and drawing attention to special features; and post-reading strategies: written questions, written summaries and review procedures.

To help teachers plan a reading unit, the researcher handed out a partially planned unit, along with suggested texts. The unit included the central questions that were being addressed; the texts that could be used to answer those questions; pre-reading, during-reading, and after-reading strategies that could be taught; and suggested activities. The plan was structured to show a progression from heavily scaffolded to minimally scaffolded instruction. Teachers were also provided with blank planning sheets to assist them with planning their own lessons. A reading by Guthrie and Ozsgungor (2002), *Instructional Contexts for Reading Engagement*, was also recommended to the teachers. This reading was chosen as it detailed a reading framework that could be used to teach non-fiction reading strategies.

During the ten weeks of the third term the researcher visited each class once a week to either model a non-fiction strategy lesson, or to observe and coach the teacher. Two

meetings were also held during this term. The first of these meetings was a combination of teacher feedback on what they had been doing in their classrooms, and further instruction from the researcher on how to teach non-fiction strategies. Most teachers expressed surprise at the positive progress their students were making in grasping the strategies. Most teachers also commented that they were becoming more confident about mentally modelling and coaching strategies.

The instruction given included additional information on how to teach vocabulary (Graves, 1998), observation of a videoed non-fiction strategy lesson which had been taken at Benchmark School, and a reading on the teaching of non-fiction strategies from chapter 5 of Blachowicz and Ogle's (2001) book. This chapter was entitled *Strategies for Reading for Information* and provided teachers with the opportunity to identify additional ideas for teaching non-fiction strategies.

The second meeting was also a time for teachers to share how they had been implementing reading comprehension strategy instruction in their classrooms, as well as to discuss which strategies they intended to teach in the fourth term – a decision that was left to teacher judgment based on the observed needs of their students.

Term 4, 2004.

As term four included a range of end-of-year activities and assessments, teachers had the option of whether or not they wanted continued input from the researcher. Most opted not to have this, though a few sought assistance with planning their lessons for the term. The final meeting in term four was an opportunity for teachers to assess their own progress as well as critique the nature of the course materials and presentation. A summary table of the professional development conducted in 2004 is included as Appendix F.

Training of Treatment Group Teacher in 2005

During 2004 the treatment group teacher, who was one of the teachers attending the reading comprehension course, had participated in intensive tutoring in the theory underpinning reading strategies and the teaching techniques that accompany strategy instruction as detailed above. The particular strategies taught by the treatment group teacher in 2004 included comprehension monitoring, activating prior knowledge, and strategies for reading non-fiction. In addition she observed the researcher modelling lessons, and participated in focus groups where teachers met to discuss difficulties and successes in strategy implementation.

The following year's professional development was conducted with two teachers in the first term and then individually with the treatment group teacher in terms 2 and 3. Professional development included a two-hour refresher course in the first term on the theory underpinning reading comprehension strategies. This course was a brief summary of the material covered in the first four workshops in 2004. This was followed by a two-hour course in both the second and third terms. These courses were designed to address the particular difficulties that the teacher identified in her own teaching. Issues addressed included the categorisation of strategies, how to scaffold lessons during the four to six weeks of teaching a particular strategy, and how to teach both inferring and imagery.

The difficulty the teacher had with the categorisation of strategies related to the many strategies mentioned in the literature. The teacher was concerned about how these strategies related to one another, and how she could be sure she was teaching the 'right' ones. In order to assist the teacher with this, the researcher provided three lists of strategies – one from Almasi (2003), one from Duffy (2003), and one from Benchmark School's *Support Teacher Handbook* (Benchmark School, 2003). These strategies had

been identified by the various authors as foundational to the understanding of text. Together with the teacher, the researcher categorised these into before reading, during reading, and after reading strategies. Similarities between strategies were noted. The teacher correctly concluded that similar strategies are merely given different names by different authors.

The knowledge of the various strategies and the similarities between them assisted the teacher in selecting strategies to teach in 2005. She decided to begin teaching comprehension monitoring, as she had taught that the previous year and felt comfortable teaching it. She then moved on to activating prior knowledge, as she regarded it a suitable precursor for the reading non-fiction strategies that she had decided to teach in the second term as part of her 'action learning' unit which focussed on reading texts for meaning in order to complete a small piece of research on dinosaurs. On the basis of teacher observation and student self-assessment, the teacher then chose to teach inferring and imagery strategies in the third term. Sample lesson plans prepared by the teacher for the activating prior knowledge, reading non-fiction, inferring, and imagery strategies are included as Appendices G to J respectively.

Scaffolding was an aspect of instruction that was noted by the teacher as being particularly difficult. She had little difficulty introducing the strategy and providing a high level of teacher support, as this is what she had frequently seen modelled by the researcher in the 2004 year. However, she was unsure about how to progressively phase out the level of support. The researcher helped the teacher with this by planning with her a series of steps for both the imagery and inferring strategies. The planning included suggested activities and texts to use at the five different levels of scaffolding to which the teachers had been introduced in the 2004 training. A sample of the inferring strategy planning is included as Appendix K. In addition to these courses, the researcher

also coached the teacher by observing her teach a half hour lesson and providing feedback. During these coaching sessions the researcher sat in an inconspicuous place and wrote an account of what happened during the reading comprehension strategy lesson. At the end of the lesson the teacher and researcher met to discuss the successes and difficulties noted, and to make plans for future lessons.

General difficulties that had arisen during the previous week's teaching were also discussed after lesson observations. One of the early concerns that the teacher mentioned related to strategies becoming atomised rather than linked to other strategies. The researcher suggested that this problem would be overcome as the teacher became more familiar with a number of strategies and also more familiar with teaching reading comprehension strategies. This did prove to be the case over time, with the teacher showing increasing ability to teach and coach students to use a number of strategies simultaneously. Another concern related to difficulties that the teacher had in teaching the whole class a strategy simultaneously. The researcher suggested dividing the class into self-managed groups which included a student whose task it was to supervise the group and prompt them to use the particular strategy being taught. This also proved to be successful over time.

There were two coaching sessions in the first term, six in the second term, and four in the third term. In addition to these sessions, the teacher opted to observe the researcher teach demonstration lessons in other schools. She observed three such lessons in the first term and two in the second term. The researcher did not model any lessons in the treatment group classes so as not to confound the results.

Treatment Group Teacher Measures

The development of the teacher's ability to teach using the reading comprehension strategy approach was assessed using a teacher interview, lesson observations, and researcher field notes. In addition, three students representing the bottom, middle, and top reading ability in the class were selected by the teacher after each session. These students were questioned to gauge whether they had understood the teacher's lesson aims. These measures were used to gauge three aspects of the teacher's progress towards becoming a strategy teacher: firstly, her own perceptions of her progress, secondly her progress as shown by the content of her lessons, and thirdly her progress as shown by her students' perceptions of her lesson aims.

Teacher's Perceived Proficiency in Teaching Reading Comprehension Strategies

Interview questions were designed to gauge the teacher's perception of her growth in becoming a proficient strategy teacher. Interviews were conducted at the beginning and end of the intervention (March and September).

The following questions were asked during the teacher interview:

1. What do you regard the benefits of reading comprehension strategy instruction to be?
2. Which children in the class strike you as using particular strategies effectively? How do you know they are using these strategies?
3. What do you regard as the most important components of strategy teaching?
4. How do you decide which strategies to teach and how to go about teaching them?
5. Do you notice any students making particular gains in metacognitive control of strategies – independently choosing and using strategies to solve particular

reading comprehension difficulties? What evidence do you have of their progress?

6. What things still concern you about teaching reading comprehension strategies? What could be done to help you overcome these concerns?

Answers to these questions were analysed according to Duffy's nine-point scale of the stages teachers go through as they become proficient strategy teachers (Duffy, 1993b). A complete copy of Duffy's nine-point scale is included as Appendix O. At point 1, Duffy suggests, teachers experience 'confusion and rejection', and at point 9 they are at an unnamed stage where, despite being creative and inventive, teachers know that they can still improve. At point 4, teachers are concerned about which strategies are 'right'. However, they are conscious of the importance of putting students in metacognitive control of the process of being strategic. The teacher was given a ranking from 1-9 on this scale, with 1 being the least proficient and 9 being the most proficient.

In order to rank the teacher accurately, her responses to the pre- and post-intervention questions were divided into phrases and then compared to Duffy's scale. For example, pre-intervention comments made in answer to the fourth question included the following: "I feel comfortable with this sequence [teaching comprehension monitoring and then activating prior knowledge] because it's what we did last year and I could see that it really worked sequentially for the students." This comment was assessed as being at point 4, as the teacher was concerned to teach a particular sequence of strategies because these appeared 'right' for the students.

In contrast, the teacher's response to question four at the post-intervention interview put her at point 8. This is described by Duffy as a 'creative-inventive' stage where 'hardly anything about strategy instruction baffle[s] teachers anymore' (Duffy,

1993a, p. 117). The teacher commented that: "In term four I want to go over what we've covered and refer back to the goals that students have self-identified through self-assessment. I will group the children and target their needs individually." Here, the teacher is using a student's needs as the basis for her planning and intends to teach to individual needs, rather than using a teaching sequence determined by previous students.

In addition, the researcher's field notes were used to assess the teacher's perception of her progress. These notes recorded salient comments made by the teacher after observed and coached lessons. These comments were also compared to Duffy's nine-point scale. For example, during the second term the teacher told the researcher that she felt overwhelmed by the reading comprehension strategy approach and was spending long hours on the weekends looking for materials and planning lessons. This comment was assessed as being at point 5, which is described as 'the wall', a point at which teachers feel anxious about various aspects of the reading comprehension strategy process.

Teacher's Progress as Evinced by Lesson Observations

Lessons were observed using a researcher-designed lesson observation form. Critical aspects of strategy instruction were noted, namely the patterns of student/teacher dialogue (IRE: Initiate, Respond, Evaluate, or EPR: Every Pupil Response) (Gaskins, Anderson, Pressley, Cunicelli, & Satlow, 1993; Gaskins & Elliot, 1991), mental modelling, giving a personal example of strategy use to encourage motivation, and praising student strategy use.

The observations made by the researcher during the lessons were analysed and compared to the teacher's perceptions of her own proficiency as shown by the teacher

interviews and researcher field notes. To analyse the teacher's progress from lesson observations, the observed critical features of comprehension strategy instruction were compared to the six components of good transactional strategy instruction that had been identified by Brown and her colleagues (R. Brown, Pressley, van Meter, & Schuder, 1996). Lesson observations at the various points of progress identified by the teacher interview and recorded in field notes were compared to the components. The various components evident in the lesson, and the quality of these components, were then assessed. Lessons showing many quality components were viewed as evidence of good strategy teaching.

The six components identified by Brown and her colleagues have been summarised from a number of other studies which investigated research-validated teacher practice. Three of these (the third, fourth and fifth) state:

3. The teachers coach students to use strategies on an as-needed basis, providing hints to students about potential strategic choices they might make. There are many mini-lessons about when it is appropriate to use particular strategies.
4. Both teachers and students model use of strategies for one another, thinking aloud as they read.
5. Throughout instruction, the usefulness of strategies is emphasised, with students reminded frequently about the comprehension gains that accompany strategy use. Information about when and where various strategies can be applied is commonly discussed. Teachers consistently model flexible use of strategies; students explain to one another how they use strategies to process texts. (R. Brown, Pressley, van Meter, & Schuder, 1996, p. 19). A complete listed of components is included as Appendix N.

The quality of the mental modelling and coaching, the patterns of dialogue, and the comments made by students were compared and contrasted with the six components identified by R. Brown et al. (1996). For example, strategy coaching in one of the initial lessons included phrases such as, "I am glad you're thinking about what you're reading", or, "So, you've been activating your prior knowledge while you've been reading", when praising students for using particular strategies. This was assessed as including the third component of good strategy instruction. However, it was not regarded as a high quality interaction, as it did not include hints about strategic choices they might make.

In contrast, toward the end of the intervention, the teacher praised a student who explained to the class how he had made pictures in his mind while reading a library book. The teacher was quick to pick up on this explanation and praised the student for using the imagery strategy and particularly for changing the picture in his mind as he read. This coaching was assessed as typifying the fourth and fifth components, as the student is thinking aloud, explaining how he used a strategy to understand self-directed reading, and the teacher is praising him for using the strategy meaningfully.

To further assess the teacher's proficiency as a reading comprehension strategy instructor, lesson observations and field notes were analysed for evidence that the teacher was moving from being researcher-dependent to taking personal ownership of the lesson planning and content. Independent actions on the part of the teacher (e.g. making suggestions about what to teach and how to teach it) were seen as evidence of personal ownership. For example, at one point the teacher told the researcher that she would like to teach the inferring strategy because she could see her students were not answering inferential questions well. The teacher then went on to disagree with the researcher's suggestions as to how she might word the strategic steps needed for the

process, formulating her own wording instead. These types of independent steps were viewed as evidence of positive progress in the teacher's development.

Teacher's progress as shown by student interviews

A final measure of the teacher's ability to teach reading comprehension strategies was taken from the students' perceptions of the central aims of the observed lessons. At the conclusion of each observed lesson three students were interviewed. These students were chosen by the teacher and were either in the top, middle, or bottom reading group in the class.

The students were asked three questions to determine whether they were aware of what the teacher taught during the lesson (declarative knowledge), when to use it (situational knowledge), and how to use it (procedural knowledge) (Duffy et al., 1987). The three questions were worded as follows:

1. What was your teacher teaching you?
2. When would you use it?
3. When you use it, how will you do it?

Responses were given orally and immediately transcribed. In order to score responses, a rating scale designed by Duffy et al. (1986) was used. Scores were assigned for students' verbal statements using a 0-4 rating scale for each of the three questions, with a score of 0 representing absence of awareness and a score of 4 representing exemplary awareness. The following is a sample of the Duffy et al. rating scale for responses to the question 'What was your teacher teaching you?'

A highly rated response to the question "what" was being taught must include a *specific* reference to the *process* involved in completing the tasks and an example:

0 No awareness. (Student does not know, is inaccurate, or supplies a response that does not make sense.)

1 The response is a non-specific reference to the task. ("We are learning about words.")

2 The response refers to the name of the specific task which can be done successfully if the process is applied correctly or is an example of the specific task. ("We are learning *ou* words.")

3 The response includes a specific reference to the process being learned. ("We are learning how to sound out *ou* words.")

4 The response includes a specific reference to the process and an example. ("We are learning how to sound out *ou* words, like in *out*.") (Duffy et al., 1986, p. 252)

A student who answered the 'what' question with the response, "We were learning strategies for reading non-fiction" was given a rating of three as they did make mention of the specific strategy being learnt. However, a student who replied, "We were learning what causes the huia to become extinct", was given a rating of two as it referred to a specific aspect of the content that was covered in the lesson, rather than the strategy.

The scores for each of the *what, when,* and *how* questions across the three levels were summed. The highest possible score was 12. A complete copy of the Rating Pupil Awareness scale is included in Appendix P. These scores were compared to the teacher's perception of her ability to teach comprehension strategies, and her level of proficiency as shown by lesson observations. High scores for student interviews were seen as evidence of good strategy teaching.

Hypotheses

Students' Ability to Comprehend Text

One of the main purposes of this study was to investigate the effect on the students of the teacher's ability to teach reading comprehension strategies. As indicated in Chapter Two, competent teachers are able to select reading comprehension strategies based on student needs. The strategies selected for instruction are not preset, but rather chosen from the range of strategies used by expert readers. The teacher makes explicit the declarative, conditional, and procedural knowledge about the strategy before mentally modelling the strategy using the text. The teacher gradually diminishes coaching and scaffolds the children who practise using the strategy. Such instruction should result in student improvement in metacognitive abilities, reading self-efficacy, and standardised reading comprehension measures. Many studies have investigated student improvement as a result of either researcher-taught lessons, or lessons taught by classroom teachers to small groups of students. Few studies, if any, have investigated the results of metacognitive instruction in situations where a trained classroom teacher has worked with an entire class of students. On this basis the following hypotheses were tested:

Hypothesis 1.

1.1 Treatment group students will obtain significantly higher scores on the IRA measure of metacognition than either treatment control, or non-treatment control students.

Rationale.

Metacognition is a construct that includes two aspects – knowledge about cognitive states, and control of those cognitive states (Paris & Winograd, 1990). Both aspects of

metacognition have been found to be amenable to change through teaching that includes direct explanation about specific strategies (Bereiter & Bird, 1985; Gaskins & Elliot, 1991; Paris & Cross, 1984; Paris & Winograd, 1990). Direct explanation provides information about why the strategy should be learnt, how it should be used, and when and where it should be used (Duffy, 2002). This information is best communicated through 'mental modelling', where teachers make evident the 'secret' knowledge about the strategy by overtly verbalising mental processes (Duffy, 2003).

To encourage transfer of metacognitive knowledge from the teacher to the student, lessons also need to be carefully scaffolded, with the teacher gradually diminishing the amount of coaching given to the student (Duffy, 2002). This gradual release of overt teaching allows the teacher to respond creatively to the students' attempts to use the strategy, coaching them as necessary.

Neither mental modelling nor scaffolding is a simple process for teachers to grasp. Teachers, in various studies have reported great difficulty in understanding how to mentally model, and in having sufficient confidence to do so in front of a group of students (Duffy, 1993a, 1993b; Duffy et al., 1987). In order to gain confidence, therefore, teachers need specific professional development that includes demonstrations within the teachers' own classrooms, coaching, sustained support, and continual pressure to persevere (Guskey, 2002; Hodges, 1996; Hughes, Cahs, Ahwee, & Klinger, 2002).

The current study focussed on a two year professional development programme that provided information and examples on how to teach reading comprehension strategies. Professional development included both theoretical information and practical demonstrations of how to directly explain and scaffold instruction. It would be expected, therefore, that the students who had received three terms of research-validated

instruction from a teacher who had received two years of professional development would have a better knowledge of the metacognitive processes involved in understanding text than students who had not received instruction from a trained teacher.

Hypothesis 2.

2.1 Treatment group students will show significantly greater gains in PAT Reading Comprehension than either treatment control or non-treatment control groups.

Rationale.

Low standardised reading comprehension results have concerned educators for some time. Research conducted by Durkin three decades ago was sparked by low comprehension scores (Durkin, 1978). In more recent years, a New Zealand study found similar results (Crooks & Flockton, 2005).

Representational theorists suggested that low reading comprehension results may be due to children being unable to construct adequate mental representations of text. These representations included linking the content of the text with the reader's background knowledge, understanding the structure of a story, identifying the most important ideas in a text, and forming mental images of what was being read (Anderson & Pearson, 1984; Idol, 1987; Kintsch & van Dijk, 1978; Sadoski, Paivio, & Goetz, 1991). Further, researchers proposed that a study of the mental processes expert readers used while reading text could be used to help children form more adequate mental representations. These mental processes were not automatic processes which are applied unconsciously (i.e., skills) (Paris, 1991), but intentional acts which are open to introspection (i.e., strategies) (Almasi, 2003). These strategies included re-reading segments of the text that were not understood, attempting to infer information not stated

in the text, relating information in the text to personal prior knowledge, making predictions, relating information in a clause to the overall theme of the passage, and paraphrasing (Olshavsky, 1976-1977; S. E. Wade, 1990; S. E. Wade, Woodrow, & Schraw, 1990; Wyatt et al., 1993).

Educational researchers (Dole, Brown, & Trathen, 1996; Duffy, 1993a; Gaskins, Anderson, Pressley, Cunicelli, & Satlow, 1993; Paris & Cross, 1984; Pressley et al., 1992), found that children could be trained to use these strategies if teachers knew how to instruct students as to which strategies were available (declarative knowledge), how to use them (procedural knowledge), and when to use them (conditional knowledge). Modelling of covert mental processes by the teacher would provide opportunity for children to hear how the teacher used introspection to adjust strategies to the task at hand (self-management of thinking, or metacognitive control). Knowledge of how to process text should lead to greater gains in standardised reading comprehension scores.

Despite the findings of researchers as to the positive outcomes of a strategy approach to the teaching of reading comprehension, skills-based instruction has continued to be the dominant approach (Pressley, 2002b). The preponderance of skills-based instruction is attributed to the difficulties in teaching strategies (Duffy, 1993b), and a general lack of teacher knowledge as to how to teach strategies (McNaughton, 2004).

In the present study, the teacher had undergone comprehensive training designed to enable proficiency in the teaching of reading comprehension strategies. This strategy focus, modelled on the reading comprehension processes of expert readers, should result in higher reading comprehension gains for the treatment group students than for non-treatment or treatment-control group students, both of whom have been taught using a non-strategic approach.

Hypothesis 3.

3.1 Treatment group students will obtain significantly higher self-efficacy scores for reading than either the treatment control, or non-treatment control students.

Rationale.

Self-efficacy beliefs or "the judgements people form of their ability to organise and execute actions that are needed to accomplish specific learning-related tasks" (Chapman & Tunmer, 2003, p. 7), influence a student's choice to accomplish a task, and the effort and persistence they will apply (Schunk, 2003). If students consider themselves capable of performing a task, they will have more positive judgements about their ability to complete that task than those with lower self-efficacy.

In order to feel capable of performing a task such as comprehending text, students need to have received specific instruction which encourages active participation on their part. Explicit teaching of reading comprehension strategies is regarded as very specific because it makes overt the covert mental processes involved in comprehending text. This, in turn, enables active cognitive processing as students are made aware of how they should be thinking.

Additionally, reading strategy instruction enables students to view internal factors, such as effort, as central to their ability to succeed. Rather than simply telling a student to 'try harder', teachers who are mentally modelling strategies can give students specific instruction as to how to implement strategies in order to understand text (Borkowski, Chan, & Muthukrishna, 2000).

Finally, students who believe that the strategies they are being taught are useful will be more likely be motivated to use them. They will, in turn, gain confidence about their abilities. As teachers share with students how they, as adults, use the strategies,

students are more inclined to see the value of the strategy and use the strategy themselves (Gaskins & Elliot, 1991).

Because the treatment group students had received specific instruction regarding the use of reading comprehension strategies, which neither of the control groups had received, it was expected that their reading self-efficacy scores would be higher.

Teacher Training

The other purpose of this study was to investigate whether a teacher at the Year 4 level could be trained to successfully implement reading comprehension strategy instruction in a whole class situation. Accordingly, the following hypotheses were proposed.

Hypothesis 4.

4.1 There will be an improvement in the teacher's perception of her ability to teach reading comprehension strategies over the course of the intervention. This will be indicated by rising scores on Duffy's nine-point scale of the stages teachers go through as they become proficient strategy teachers. Interviews conducted with the teacher, and field notes about post lesson observation conversations, will show this improvement.

4.2 There will be improvement in the teacher's ability to teach reading comprehension strategies over the course of the intervention. This will be indicated by teaching practices that demonstrate personal ownership of the components of good transactional strategy instruction as defined by R. Brown et al. (1996).

4.3 Students at all ability levels will increasingly become aware of the declarative, procedural, and conditional knowledge necessary for strategy usage as shown by higher scores on student interviews. This increasing awareness will be an indicator of the teacher's developing ability to explicitly teach these aspects of reading comprehension instruction.

Rationale.

Duffy (1993b) investigated the points of progress that teachers go through as they become competent teachers of reading strategies and found that most teachers proceed through nine stages. The first stages are characterised by confusion and rejection and a desire on the part of the teacher to control the strategies. From there, Duffy suggests, teachers become increasingly confident, moving through stages of trying out the strategies tentatively and modelling them with a concern to teach the 'right' ones. Teachers then reach a level Duffy terms 'the wall', where they become despondent about their ability to grasp the nebulous nature of strategy instruction. They become concerned that they do not know how to incorporate strategy teaching into their classroom reading programmes. At this point some teachers despair of ever becoming competent strategy teachers. Others move on to increasing confidence, getting 'over the hump' of 'the wall' and moving on to greater understanding of the processes involved until they become creative in adapting strategy instruction to the needs of their students.

As teachers become more confident in their strategy teaching, they should also increasingly demonstrate the hallmarks of good strategy instruction. Good strategy instruction includes encouraging active student engagement through requiring every pupil to respond to a question (EPR – 'Every Pupil Response') (Gaskins, 1995; Gaskins, Anderson, Pressley, Cunicelli, & Satlow, 1993), rather than only one student (IRE – the

teacher Initiates dialogue by asking a question, the student Responds, and the teacher Evaluates the student's response) (Gaskins, 1995; Gaskins, Anderson, Pressley, Cunicelli, & Satlow, 1993) .

In addition, teachers need to be aware of the mental processes students are using and help them to adapt these to the particular text being read. To do this, teachers need to model their own thinking processes and coach students to use particular reading strategies when difficulties arise (Duffy, 1993b; Roehler & Duffy, 1991). By providing examples of when they use strategies, teachers will also help students to be motivated to use these strategies themselves (Gaskins, 1988).

Previous studies investigating the training of teachers in order to help them become proficient reading comprehension instructors found that professional development needed to include the theory behind the strategy approach, in-class modelling and coaching, and discussions with other professionals (Duffy, 1993a, 1993b; Duffy & Roehler, 1987). To be effective this training needed to be sustained over several years.

The training in this study included eight hours of theory dedicated to the metacognitive aspects of strategy instruction, components of good strategy instruction and characteristics of a good strategy user. It also included two years of in-class modelling and coaching. It was expected that this training, combined with the workshops which focussed on the theoretical aspects of strategy instruction, would lead to improvement in the teacher's ability to teach reading comprehension strategies.

Finally, a study of the effectiveness of explaining reading comprehension strategies found that students increased their declarative, procedural, and conditional knowledge of strategies as a result of explicit teaching (Duffy et al., 1986). As teachers became increasingly competent in their ability to teach strategies, students became increasingly aware of teachers' intended declarative, procedural, and conditional lesson aims (Duffy,

1993b). The students in Duffy et al's study were poor readers. As instruction in reading comprehension strategies should benefit all readers (Andre & Anderson, 1979; A. L. Brown & Smiley, 1978; Gordon & Braun, 1985; Hare & Borchardt, 1984; Langer, 1984), it was expected that reading comprehension instruction by an increasingly competent teacher in a whole-class situation would show increasing gains in declarative, procedural, and conditional knowledge for students of all ability levels.

Procedure

Student Measures

Student measures of metacognitive awareness, decoding, standardised reading comprehension, and self-efficacy were administered in March and September to all the students in the sample. Year 3 students in the non-treatment control classes did not complete any of the tests as they were not part of the sample. Year 3 students in the treatment group did complete all of the tests, in order to give assessment information to the classroom teacher, but these data were not included in the research. Classroom teachers administered the PAT test in the first term as this was part of each school's routine testing. The researcher administered the remaining treatment and treatment control class tests, and testers administered the remaining tests in the non-treatment control classes. One tester administered all the remaining pre-tests in the non-treatment control classes and a different tester administered all the post-tests. Testers were given written and verbal instructions on test administration procedures. All pre-tests were administered in the fourth and fifth weeks of the first term and all post-tests in the eighth and ninth weeks of the third term, approximately six months apart.

Students were informed that the Index of Reading Awareness was to provide information about some of the things they did while reading. Each item was read aloud

by the tester. The following instructions were given before the test items were read aloud:

> *You are going to be given a short test on some of the things that you do when you read. I will read each question and its answers aloud only once. Please circle the letter of the answer that you think is best.*

Each item was then read aloud by the tester, who circulated while students circled answers to make sure they had understood the directions.

The testing time was approximately 20 minutes.

The decoding test (Pseudoword Naming Test) was administered individually to students. The instructions for this test were as follows:

> *Today I'm going to show you some funny sounding names. These are the names of children who live in a far away land. Let's pretend that we are going to visit these children and want to learn to say their names the way they do. You can read their names only if you sound them out. Remember, do not try to make them into real words. Let's try this one.* [The first practice item, *ez*, was presented and the child was encouraged to sound it out. If the child failed to respond correctly, or failed to respond after 5 to 10 seconds, the tester demonstrated how to sound out the item.] *This letter makes an /e/ sound and this letter makes a /z/ sound, so the name is /e/-/z/, ez.* [The tester then presented the second practice item and, if necessary, demonstrated how to sound it out.] *Okay, now I'm going to show you some names and I want to see if you can tell me how to say them.* [The child was encouraged to sound out each name. General encouragement was given throughout the test session but no corrective feedback was provided.]

These pseudowords were printed on cards in groups of five. Students read the pseudowords aloud to the tester, who marked them on a separate sheet. Each test took approximately 5 minutes to administer.

The PAT Reading Comprehension was administered according to the standardised procedures outlined in the manuals. Students completed practice items and then progressed through the test on their own for a maximum of 45 minutes. Before the students began the test, the following instructions were given:

This is a test of how well you understand what you read. Read each story carefully and then answer the questions beside it. Four or five answers are given for each question. You are to choose the ***one*** *answer you think is* ***best****.* [The following story was then read]. *Uncle Fred is a very good fisherman. On fine weekends he goes out in his launch with his box of lines, hooks, and bait. He always brings home a sack of big silver fish. Question S.1. What does Uncle Fred have in his sack?*

(a) Lines and hooks.

(b) Bait.

(c) Fish.

(d) Silver.

(e) *The writer does not say.*

[The tester then paused while students considered the best response and filled it in on their answer sheet]. *The* ***best*** *answer is 'Fish'. You will see that 'Fish' has the letter C in front of it. Now look at your Answer Sheet. You will see that the letter C has been printed in the brackets beside S.1. in the* ***first*** *box. This is how you will answer the questions. In the brackets, just print the letter of the answer you choose.*

[Students were then directed to complete another sample question and then asked to begin the test, which was timed for 45 minutes.]

Students were informed that the self-efficacy questionnaire was to find out how they felt about some of the things they did in school and that answers would vary. It was emphasised that students would have different feelings so it was important that they respond honestly. It was further emphasised that the questionnaire was not a 'test' and that there were no right or wrong answers to the questions. The following instructions were given:

> *I'm going to ask you about some things you do in school. This is not a test, and different kids will have different answers. Each time I ask you if you think you can do something, I want you to show me on your answer sheet how sure you think you are that you can do it by circling a word. If you make a mistake, just put a cross through it and circle another word. It's important for you to be very honest with your answer. Answer how you really feel, not how you think others would like you to feel. Let's practise.*

Students were then given four practice items to complete, which were checked to ensure that all children understood the directions. The testing time was approximately 20 minutes and all items were read aloud by the tester to the students in order to ensure that possible confounding effects due to reading problems would be minimised.

Teacher Measures

The teacher interview consisted of six questions that were asked and responded to orally. Answers were compiled by the researcher and submitted to the teacher to check their accuracy. The interviews were conducted by the researcher in the fifth week of the first term and at the end of the third term, approximately six months apart.

Lesson observations were conducted in both the teacher's own classroom and the adjoining classroom. The teacher taught all the reading comprehension strategy lessons

in the adjoining class during the second and third terms to provide continuity, due to the resignation of the original classroom teacher (who had also been a treatment group teacher) at the end of the first term. Lessons in the two classrooms were of the same duration (45 minutes, four times per week), and used identical lesson plans. Two observations were conducted in the teacher's own classroom during the first term (weeks 8 and 11). Six lessons were observed in the second term (weeks 3, 7, and 9), and six in the third term (weeks 2, 5 and 8). The lessons observed in the second and third terms were conducted both in the teacher's own class and in the neighbouring class. Pairs of lessons were observed immediately after one another on the same day. The order of observations remained consistent with lessons in the neighbouring class being observed first. Thus, the 12 lessons observed in terms two and three represent six planned lessons. In total, 14 lessons were observed.

Of the 14 lessons observed, the first six (23rd of March to the 15th of June) focussed on the teaching of non-fiction strategies. The latter four lessons comprised two sets of paired lessons that had been taught in both the neighbouring classroom, and the teacher's own classroom. The four subsequent lessons (observed on the 29th of June and the 4th of August) focussed on the beginning and end of a series of lessons on the inferring strategy. The remaining four lesson observations (24th of August and the 14th of September) were of lessons at the beginning and middle of a series on imagery. In total, the teacher taught 40 lessons on the teaching of non-fiction in each class, 20 on inferring, and 20 on imagery.

To observe lessons, the researcher sat in an inconspicuous place in the classroom and took written notes during the lesson. Examples of mental modelling, personal examples of strategy use, praising students for using strategies, and teacher questioning, were written down verbatim. It was decided not to include teacher questioning in the

analysis of the data as it was not a dominant theme in the literature on the teaching of reading comprehension strategies. The other aspects of teacher dialogue that were measured better accounted for the types of teacher dialogue identified in the literature as important. A copy of the lesson observation form is included as Appendix Q. A summary of strategies taught by the treatment teacher is included as Appendix R.

Immediately after the observed lesson three students were selected by the teacher for the student interviews. These students represented the bottom, middle, and top reading levels in the class. In order to obtain a range of student responses within the three levels, different students were selected for each interview. The researcher sat with the student in the classroom and asked each student the three interview questions privately and wrote down their responses verbatim.

Design

For the quantitative data the hypotheses presented in this study were tested by means of a 2 x 3 analysis of variance design with repeated measures. The respective levels were time of testing (pre-test and post-test) and group (treatment, treatment control, and non-treatment control). The mean difference between the pre-tests and post-tests for the various groups are central to this investigation.

The qualitative data that were collected summarised the teacher's ability to successfully implement reading comprehension strategy instruction. These data were compared with the quantitative data and used to assist with interpretation of the results.

CHAPTER 4

Results

Quantitative Data

An increase in the teacher's ability to teach reading comprehension strategies should result in a range of improved outcomes for students. Thus it was hypothesised that students who had received research-validated instruction in how to understand text would perform better than students who had not received this instruction. The superior performance of the treatment group students should be seen in their knowledge of the metacognitive strategies needed for the understanding of text, their results on a standardised measure of reading comprehension, and their confidence to perform reading comprehension tasks.

To test this proposition, students' metacognitive awareness, reading comprehension, and self-efficacy were assessed. The results of these tests were analysed by a series of 2 x 3 analyses of variance with repeated measures. Where significant interaction effects were observed, gain scores (calculated by subtracting pre-test scores from post-test scores for each group) were treated by means of a series of one-way analyses of variance. Post-hoc comparisons (Bonferroni) were then calculated on these gain scores to identify which of the three groups were responsible for the interaction effect. In this situation, analysis of gain scores is identical to the analysis of the groups by time (pre-post) interaction effect, but the procedure provides an easier method for identifying the cause of the interaction effect.

Metacognition

The results of the two-way analyses of variance for the total scores on the Index of Reading Awareness (IRA) show a significant effect for Time $F(1,147) = 23.49$, $p < .001$, and a significant effect for Group $F(2,147) = 5.76$, $p < .01$. There was also a Time x Group interaction effect $F(2,147) = 6.50$, $p < .01$.

To examine the cause of the interaction effect, post-hoc comparisons (Bonferroni) were calculated. These show that the treatment group performed significantly better than either the treatment control group (mean difference = 3.03, $p < .05$), or the non-treatment control group (mean difference = 3.25, $p < .05$).

Given the significant effects for the Full Scale score for the Index of Reading Awareness scale, two-way analyses of variance were conducted on each subscale. Table 4 shows the full and subscale means, standard deviations, and F ratios for the one-way ANOVA test of the interaction effects.

For the Evaluation subscale there were significant main effects for Time $F(1,147) = 4.74$, $p < .05$ and Group $F(2,147) = 15.20$, $p < .01$, but there was no significant interaction effect $F(2,147) = .16$, $p = .85$. Each group's evaluation score was higher at the time of post-testing. The Group effect was due to the treatment control group obtaining higher scores than either of the other two groups on both testing occasions.

For Planning there was a significant effect for Time $F(1,147) = 13.09$, $p < .01$ but not for Group $F(2,147) = 0.96$, $p = .39$. However, there was a significant interaction effect $F(2,147) = 7.11$, $p < .01$. Bonferroni tests revealed that the interaction effect was due to significant differences for Planning between the treatment group and the treatment control group (mean differences 1.34, $p < .01$) and the treatment group and the non-treatment control group (mean difference = 1.64, $p < .01$). These data show that

treatment group students had significantly better awareness of how to plan ahead for a specific purpose when reading.

For the Regulation subscale, there was a significant effect for Time $F(1,147) = 8.22$, $p < .01$. Each group's regulation score was higher for the post-testing occasions than the pre-testing. There were no significant Group $F(2,147) = 1.86$, $p = .16$ or interaction effects $F(2,147) = 0.50$, $p = .61$.

Finally, for Conditional Knowledge there was a significant Time effect $F(1,147) = 7.66$, $p < .01$ but not a significant Group effect $F(2,147) = 0.84$, $p = .43$. However, the interaction effect was significant $F(2,147) = 4.21$, $p < .05$. Bonferroni tests revealed that this interaction effect was due to significant differences between the treatment and treatment control group for conditional knowledge (mean difference = 1.11, $p < .05$). The treatment group students had significantly better understanding of when and why particular reading strategies should be applied than treatment control students.

Table 4

Summary Data for the Index of Reading Awareness Full and Subscale Scores

	Treatment				Treatment control				Non-treatment control					
	Pre-test		Post-test		Pre-test		Post-test		Pre-test		Post-test			
	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	F[1]	P
Full scale	22.62	4.04	26.71	4.11	25.39	4.01	26.44	3.78	23.46	3.39	24.29	4.26	6.503	.002*
Evaluation	6.08	1.74	6.60	1.54	7.18	1.62	7.46	1.87	5.88	1.47	6.27	1.48	0.163	.850
Planning	5.85	1.86	7.52	1.71	6.61	1.41	6.93	1.45	6.44	1.70	6.46	1.60	7.113	.001*
Regulation	4.77	1.36	5.44	1.68	5.36	1.80	5.79	1.63	5.02	1.93	5.29	1.69	0.496	.610
Conditional knowledge	5.92	1.83	7.15	1.57	6.25	1.87	6.36	1.57	6.12	1.6	6.27	1.45	4.212	.017*

* Significant effect

[1] F-ratios for interaction effects

To summarise, the teacher's competence in explaining reading strategies appears to have led to an overall increase in children's awareness of metacognitive reading processes. This increase in awareness was evident in the Full Scale scores of the IRA. Two of the four subscale areas assessed by the IRA (Planning and Conditional Knowledge) showed significant gains for treatment students. Despite the fact that the treatment group had the least metacognitive knowledge at the beginning of the intervention (treatment mean = 22.62, treatment control mean = 25.39, non-treatment control mean = 23.46), treatment group full scale gains following the intervention were significantly higher than either of the two control groups. In addition, it would appear that a focus on a strategy approach in mathematics (as the treatment control group had) did not lead to gains in metacognitive knowledge in reading. This suggests that a specific focus on the development of reading-related metacognitive knowledge was associated with the improvement, rather than merely having an intervention. Thus the research hypothesis that treatment group students would perform significantly better on the IRA than either of the control groups was supported.

Standardised Reading Comprehension

An increase in awareness of the metacognitive processes used in reading should lead to higher scores in reading comprehension. The results of the two-way analyses of variance for the PAT reading comprehension show a significant effect for Time, $F(1,139) = 76.03, p < .001$, and a significant effect for Group $F(2,139) = 3.92, p < .05$. There was a marginally significant Time x Group interaction effect, $F(2,139) = 2.99, p = .05$.

The hypothesis that treatment group students would obtain significantly higher post-test scores in PAT reading comprehension than either the treatment control or non-treatment control groups was not supported. There was a significant interaction effect for reading comprehension raw score, but the pre to post mean scores (treatment 18.42 to 22.63, non-treatment control 21.64 to 26.69, non-treatment control 22.46 to 24.85) showed that the treatment group made a raw score gain of 4.21, the treatment control group made a gain of 5.05, and the non-treatment control made a gain of 2.39. Post-hoc comparisons (Bonferroni) between the treatment group and the other two groups failed to reach the .05 level of statistical significance, though the treatment control group was significantly better than the non-treatment control group (mean difference = 2.67, $p <$ .05). These results are summarised in Table 5.

Table 5

Summary Data for PAT Reading Comprehension Scores

Treatment				Treatment control				Non-treatment control					
Pre-test		Post-test		Pre-test		Post-test		Pre-test		Post-test			
mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	F[1]	P
18.42	7.22	22.63	7.33	21.64	8.21	26.69	8.09	22.46	6.02	24.85	7.04	2.987	.054*

* Marginally significant effect

[1] F-ratios for interaction effects

The expectation that a group of students who had been trained in reading comprehension strategies by a competent strategy teacher would be significantly better at reading comprehension was not supported. The treatment group did make gains, but post-hoc comparisons indicated that the gains were not significantly better than the gains of the non-treatment control or the treatment control. The only significant gain was between the treatment control group (who received numeracy teaching) and the non-treatment control group. This finding indicates that significant improvements in reading comprehension did not occur for the intervention students.

According to the simple view of reading, decoding is an important aspect of comprehension, as the ability to translate print into linguistic form is central to the reading process (Juel, 1994). Therefore, results from the pseudoword naming test will also be discussed.

The results of the two-way analyses of variance for the Pseudoword Naming Task (PNT) show a significant effect for both Time $F(1,147) = 84.83$, $p < .001$, and Group $F(2,147) = 9.15$, $p < .001$. There was also a Time x Group interaction effect $F(2,147) = 5.07$, $p < .01$.

The results of the PNT indicate that the treatment group was lower overall than either the treatment control or the non-treatment control groups on the pre-testing occasion (28.40 treatment group, 39.59 non-treatment control, 41.68 treatment control). Bonferroni post-hoc comparisons show these differences to be significant ($p < .01$).

At the time of post-testing, the treatment group also had a mean score lower than either of the control groups (35.02 treatment group, 45.52 treatment control, 44.15 non-treatment control). These differences are also significant ($p < .01$).

In terms of gain scores, however, Bonferroni tests indicate that the treatment group made significantly better progress than the non-treatment control group ($p < .05$).

The treatment control group also made significantly greater progress than the non-treatment control group (p <.05). These results are summarised in Table 6.

Table 6

Summary Data for Pseudoword Decoding Scores

Treatment				Treatment control				Non-treatment control					
Pre-test		Post-test		Pre-test		Post-test		Pre-test		Post-test			
mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	F[1]	P
28.40	18.04	35.02	16.72	39.59	14.91	45.52	12.89	41.68	14.05	44.15	13.20	5.065	.007*

* Significant effect

[1] F-ratios for interaction effects

Students in the treatment group made significantly greater gains following the intervention than did the non-treatment control group and slightly greater gains than the treatment control group. Treatment group students did not, however, reach the same level of ability in pseudoword decoding as the other two groups.

Self-efficacy

For reading self-efficacy scores there was a significant effect for Time $F(1,147) = 26.72$, $p < .001$, but not for Group $F(2,147) = 0.38$, $p > .05$. There was also a significant Time x Group interaction effect $F(2,147) = 3.28$, $p < .05$. Post-hoc comparisons showed a statistically significant mean difference of 3.20, $p < .05$ between treatment and non-treatment control groups. For the treatment and treatment control groups the mean difference of 2.20 was not statistically significant ($p = .19$), but the gains for the treatment group were in the right direction, indicating some improvement relative to the treatment control group.

The results of the two-way analyses of variance for the numeracy self-efficacy show a significant effect for Time $F(1,147) = 37.74$, $p < .001$, but not for Group $F(2.147) = 1.40$, $p>.05$. There was a significant Time x Group interaction effect $F(2,147) = 5.34$, $p < .01$. Post-hoc comparisons show that this effect was due to the treatment control group performing significantly better than the non-treatment control group (mean difference = 2.81, $p < .05$). The treatment control group also performed better than the treatment group. This result, however, was not significant (mean difference = 1.63, $p = .16$). The hypothesis that the treatment control (numeracy) group would obtain significantly higher post-intervention scores for numeracy self-efficacy than the non-treatment control group was therefore supported. The reading and

numeracy subscale scores for the self-efficacy measures, means, standard deviations, and *F*-Ratios are presented in Table 7.

Table 7

Interaction Effects for Pre-test Means, Post-test Means, Standard Deviations, and F-ratios for the Self-efficacy Test Full and Subscale Scores

	Treatment				Treatment control				Non-treatment control					
	Pre-test		Post-test		Pre-test		Post-test		Pre-test		Post-test			
	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	F[1]	P
Numeracy	16.6	4.76	18.67	4.98	16.44	4.93	20.13	3.41	18.63	4.52	19.51	4.95	5.336	.01*
Reading	23.13	5.2	27.54	4.97	23.59	6.01	25.80	4.59	24.73	5.69	25.95	5.64	3.278	.04*

* Significant effect

[1] F-ratios for significant effect

There was an expectation that students who had received reading comprehension strategy instruction would be more confident about their ability to perform reading tasks than those who had not received such instruction. Although gains were not statistically significant, they were strongly in the right direction. The expectation that the treatment control group that was participating in the NumP project would be significantly more confident about their mathematical ability than students not involved in the NumP project only applied to students who were not receiving reading comprehension strategy instruction.

In sum, analysis of the quantitative data showed significant improvements in the treatment students' knowledge of metacognitive strategies, especially in terms of planning and conditional knowledge. In addition, improvements in reading comprehension were also observed, although individual comparisons of means using the stringent Bonferroni test failed to reach conventional levels of statistical significance. Although gains in decoding were not part of the research hypotheses, the treatment students made greater gains in pseudoword decoding than control group students. Despite these gains, treatment group decoding scores were still lower at post-testing than either of the control groups. Confidence in reading comprehension ability was only evident in comparison to the non-treatment control group. Findings from the student measures compared and contrasted with the teacher's actions are reported in the next section.

Teacher data

Two interviews conducted with the teacher, along with field notes taken by the researcher, were analysed to assess the teacher's perception of her growth in ability to teach reading comprehension strategies. These results were compared to Duffy's

(1993b) nine points of progress. The findings from the teacher interviews and researcher field notes confirm the first hypothesis regarding growth in the teacher's ability to teach reading comprehension strategies over the course of the intervention.

Teacher's Perceived Proficiency in Teaching Reading Comprehension Strategies

As the formal data about the teacher's level of proficiency as a strategy teacher were not collected until the teacher was in her second year of teaching reading comprehension strategies, the initial stages in Duffy's points of progress (confusion and rejection, teacher control of the strategies, and trying out) were not observed. The teacher later commented to the researcher that she could identify with each of these points in her first year of teaching strategies. Formal interview responses and informal conversations with the teacher during the second year, however, indicated that the teacher viewed herself as having moved through the following five points of progress that Duffy identified, in becoming a proficient strategy teacher.

The pre-intervention interview conducted at the beginning of the teacher's second year as a strategy teacher indicated that she was at point 4 in Duffy's scheme. Duffy (1993b) identifies this level as 'modelling process into content' which is characterised, in part, by the teacher's desire to teach the 'right' strategies.

During that interview, the teacher talked about choosing strategies to teach on the basis of student needs, but then went on to talk about using strategies in a particular sequence: first teaching comprehension monitoring, then activating prior knowledge. She commented that, "I felt comfortable with this sequence because it's what we did last year and I could see that it really worked sequentially with the students." Thus her perception that she was targeting students' needs was inconsistent with her practice of

teaching strategies in a particular sequence, on the basis of her observation of what had benefited the *previous* year's students.

In addition, during several post-lesson conversations with the researcher during the first term, the teacher mentioned concerns about which particular strategies were available and how she would know she was teaching the 'right' ones. She specifically requested that the researcher address this at one of the early professional development sessions.

Being at the early stages of development as a strategy teacher, the teacher also mentioned difficulties with teaching the whole class the strategy, an aspect not mentioned in Duffy's research, as his teachers were teaching small groups. She commented in the March teacher interview that, "The whole class teaching is a concern in that I lose control in getting some people to talk and communicate, whereas they would in a smaller group."

According to Duffy, teachers at this stage also show greater awareness of the importance of putting students in metacognitive control of the process of being strategic than teachers operating at point 3. This was also evident in comments made during the March teacher interview:

> I think it [reading comprehension instruction] empowers the students to know what to do when they get stuck. This was particularly evident when we dealt with non-fiction. We can take for granted that they'll get this by osmosis, but they don't … They need to know why they are doing it and where they can use and apply it and how it works out in every-day life.

This statement reflects a need to give students declarative knowledge (what to do), procedural knowledge (how to do the strategy), and conditional knowledge (where to

use the strategy). This awareness on the part of the teacher indicates her understanding of the metacognitive aspects of strategy instruction.

During the second term of the year, the teacher offered to teach reading comprehension strategies in both her classroom and the neighbouring classroom, as the neighbouring class teacher, who initially had also been part of the research, had taken a term's leave of absence to help care for a critically ill relative. This teacher subsequently resigned her position at the school. The teacher who remained later described herself as having hit 'the wall' at this time, which is point 5 on Duffy's scale.

This level of progress is characterised by teachers' feeling anxiety about various aspects of strategy instruction. They realise that "despite limited instructional materials and limited preparation time, they must somehow figure out how to make strategies genuinely useful for students" (Duffy, 1993b, p. 115). This realisation was evident in the teacher's comments. She felt very much alone in the teaching process as her 'buddy', who was teaching the same strategies, had left the school. The teacher began to express frustration that she was short of resource material and therefore found it difficult to teach using a strategy approach.

During this time the teacher also lamented the time it was taking her to get herself prepared for her reading lessons. She talked about spending many hours during the weekends looking through suggested activities in order to find the right ones for her students. Duffy also noticed this kind of response in teachers who were at point 5. They

> continued to search for ways to simplify strategy teaching, wishing for lists of approved strategies even while beginning to understand that such lists would not free them from a need to engage students in authentic literacy activity, and they continued to search for commercial programs to purchase and to demand directives from staff developers even while beginning to understand that such prescriptions

cannot match teacher-created responses to students' interests and concerns. (Duffy, 1993b, p. 115)

About a month after this time of frustration, the teacher began to feel more confident about her teaching. She commented to the researcher that she felt she had climbed over the wall and was now at point 6, "over the hump". At this point, a stage that Duffy notes not all teachers reach, it is accepted that "strategy instruction means much more than teaching individual strategies" (Duffy, 1993b, p. 116). The goal for teachers becomes "pursuit of an authentic goal, solving a genuine problem, or producing a genuine product" (Duffy, 1993b, p. 116).

One of the indicators of the teacher being "over the hump" was that she became aware of student difficulties, and deliberately planned lessons to address student needs. She had noted that her students were having problems answering inferring questions, both orally and in written form. She decided, with little input from the researcher, that she wanted to teach her students this strategy. Rather than looking for a prescribed way to do this, she drafted her own set of procedural steps.

In addition, the teacher began to address the difficulty she had earlier raised of teaching strategies in a whole-class setting. She decided to divide the class into groups of three, each comprising one capable and two less-capable readers. During the time that students applied the strategy to a reading task (looking through a set of non-fiction books to find the answer to a research question, for example), the more capable reader would act as a prompt for the less capable readers, helping them to apply the strategy, and assisting with the reading of any difficult words.

Another indication of the move to this step was the teacher's confidence in speaking to others about the strategy approach. Because the researcher was also employed as a literacy adviser at the time of the research, she invited the teacher to

speak to teachers in other schools about the reading comprehension strategy approach. The teacher, shortly after her comments about having attained point 6, spoke to a group of teachers about how to teach non-fiction strategies. She was able to clearly articulate the differences between strategy and skill-based teaching, and was also able to answer teacher questions and make suggestions as to what they could do to improve their practice.

Despite this new-found confidence in strategy teaching, however, the teacher still expressed some concerns. During a discussion after the researcher had observed a lesson where the teacher had focussed on inferring, the teacher mentioned that she was troubled that she may have begun to teach imagery as well as inferring. Additionally, she was concerned about the progression of steps within her inferring lessons. These comments are indicative of point 7: "I don't quite get it yet". At this point, teachers still hold to the belief that there is a 'right' way to 'do' strategies. Receiving reassurance that they are capable of creating their own variations of a strategy encourages teachers to persevere and become more creative.

The teacher did gain this confidence by the end of the year. At the final interview she commented that:

> It's all about the students taking responsibility and taking control. The way that the strategies are structured enables me to look at the student needs and target the strategies to the needs. It's not 'a book a day' but rather makes students more active readers.

This comment indicates a move to point 8, or the 'creative-inventive' stage. At this point teachers are able to revise, invent, or skip strategies depending on the needs they see in their students. They also acknowledge that, "What was important was that students used text for authentic purposes and, while doing so, used strategies to resolve

difficulties and construct meaning" (Duffy, 1993b, p. 117). The teacher acknowledged this too, stating that:

> Strategy teaching is not just during reading time. It's woven right through the day e.g., reading a novel after lunch, during topic time, poetry. We're always talking about different aspects of reading strategies. It's everywhere, not just during reading time!

The teacher's move to this level of confidence was also evident in her eagerness to encourage others within her school to adopt the strategy approach to teaching reading. Her school principal asked her to conduct professional development within the school during the following year. In addition, the teacher reported to two groups of national literacy facilitators on what she had learnt, and how she had changed her teaching as a result of the adopted approach. She was very enthusiastic about both her own progress and that of her students, citing many evidences of change for both. These included her ability to implement strategy teaching in many subject areas, positive feedback from parents, and ability of students to talk about the strategies they were learning.

The teacher's perception that she had progressed from point 4 to point 8 over the course of a year confirms the research hypothesis that a teacher will increase in the ability to teach reading comprehension strategies as a result of the professional development.

Teacher's Progress as Indicated by Lesson Observations

The teacher's perception of her own progress was that she had gained much confidence in teaching reading comprehension using a strategy approach over the course of the intervention. In order to verify her perception of her own progress, lesson

observations were conducted. These were analysed to assess whether they showed the teacher increasingly taking ownership of the components of good strategy instruction.

As mentioned above, at the beginning of the year the teacher's interview responses and anecdotal comments indicated that she was at point 4 on Duffy's scale. This level is confirmed by observations of her teaching at this time. Observations of her lessons during the first term showed that she was including coaching, explanations, and mental modelling of effective comprehension strategies (the second and third of R. Brown et al.'s (1996) components). However, these explanations were scripted according to specific professional development given by the researcher. For example, the researcher suggested that the teacher explain the activating prior knowledge strategy to the students using a 'reading detective' metaphor. The teacher used this faithfully, including the identical wording for the explanation of the strategy that the researcher suggested.

Her coaching of the students in these early lessons was also rather stilted, being affirming, rather than "providing hints to students about potential strategic choices they might make" (R. Brown, Pressley, van Meter, & Schuder, 1996, p. 19). For example, when a student answered a question correctly, the teacher replied "I am glad you're thinking about what you're reading", or, "So, you've been activating your prior knowledge while you've been reading."

The patterns of dialogue during these early lessons were also very teacher directed. She would pose a question, have one student answer, evaluate this response, and then ask another question (IRE pattern). This is contrary to the *discussion* of text content suggested by R. Brown et al. (1996) in their sixth component. The teacher was aware that her teaching was scripted, but was afraid to depart from the 'right' way of teaching reading comprehension. She commented to the researcher that she felt her lessons were stilted and the children inattentive.

In sum, only two of R. Brown et al.'s (1996) six components were evident in the early observed lessons. This paucity of important instructional components confirms the teacher's comments in the teacher interview, indicating that she was operating at point 4 of Duffy's scale at this stage.

During the second term of the intervention, the teacher felt she had hit 'the wall'. This too was evident in the teacher's need to have explicit guidance from the researcher. The teacher continued to express frustration at the stilted nature of her lessons. The researcher suggested that she use library books rather than using the limited School Journal resources within the school. Once again the teacher took this idea on, following all the steps that had been proposed. Suggestions included devising questions that could be answered by a set of books and handing these books out in sets to groups of children in order for them to practise the strategy.

The teacher's mental modelling of the strategies, however, did improve during this time. When working with her own students, rather than those of the neighbouring class, she became more adept at explaining the usefulness of the strategies throughout instruction (adding the fifth of R. Brown et al's (1996) components to the third and fourth evident above). For example, after handing out sets of library books with accompanying questions, the teacher circulated around various groups and prompted them to use strategies. Some of her coaching included comments such as, "Did you see what she did to find the information? She found a key word." When explaining to one child in a group why the others had not chosen particular books to peruse further the teacher commented, "They surveyed the text really quickly and got rid of these [irrelevant] books".

Students in the class also began to comment on the strategies they were using. While working in groups to find answers to questions, one child corrected another,

commenting, "We need to write down what we already know before we start reading. You've got to activate your prior knowledge." Another questioned a classmate, "I know that book's got an interesting cover, but how do you know it will answer our question?" These comments also reflected an aspect of text dialogue mentioned by R. Brown et al., namely, "Teachers consistently model flexible use of strategies; students explain to one another how they use strategies to process text" (1996, p. 19, fifth component). This kind of talk between students also indicated a shift in teacher/student dialogue patterns from IRE (Initiate, Respond Evaluate) to EPR (Every Pupil Response). It also reflected an aspect of the fifth component, "Information about when and where various strategies can be applied is commonly discussed" (R. Brown et al, 1996, p. 19).

After feeling for about a month that she had 'hit the wall', the teacher commented that she perceived herself to be at Duffy's sixth point of progress, or, 'over the hump'. At a professional development session, the researcher recommended two readings to the teacher (Beers, 2003; Duffy, 2003), which addressed how to teach inferring. Rather than relying on either of these as prescriptions, the teacher adapted both to formulate her own 'secret to doing it' with her class. She carefully chose the following wording which she believed would be most easily understood by her students:

1. Know what the author has written;
2. Understand what the author wants us to know, but has not written;
3. Use your background knowledge;
4. Decide what the hidden or deeper meaning is.

Further to this demonstration of personally taking ownership of the process of strategy instruction planning, in the next lesson the teacher introduced the new strategy by saying the following:

> When I read fiction I always need to make sure I understand what I am reading and that I know what the author is saying. Sometimes an author does not write down all the important ideas and meanings in words. So as I read I need to figure them out using the clues the author has given me, just like a detective solves a mystery. This reading strategy is called inferring. Inferring happens when I put together the words with what the author means, (but does not always write down and put into words), along with my background knowledge, and decide what the author's hidden message is.

The teacher then read a passage from *The Lion, the Witch and the Wardrobe* by C.S. Lewis (1987) in which Peter tells the other children they need not worry about other people in the house hearing their noise: "It's about ten minutes walk from here down to that dining room and any amount of stairs and passages in-between". The teacher then said the following:

> I had to infer that the professor's house must be really large if it takes ten minutes to get from the bedrooms to the dining room, because at my house it would take me less than half a minute! The author also mentioned the stairs so I am assuming that the house must be two storied and that the bedrooms were upstairs because you had to go downstairs to get to the dining room. This is what you need to do when you are reading. You need to infer.

Both the introduction to the strategy and the personal example indicate that the teacher was including the second, fourth, and fifth of R. Brown et al.'s (1996) components. She was explaining the effectiveness of one strategy, modelling the process using a 'think-aloud' and emphasising the usefulness of the strategy by using a text that she was reading to the class at the time. The addition of another of R. Brown et al.'s (1996) components, (the fourth), is evidence of further progress.

Although the teacher's ability to teach reading comprehension strategies appeared to be progressing very well at this point, it was shortly after this lesson that she mentioned that she was despondent about her teaching (Duffy's point 7). Her concern centred mainly on teaching two strategies at once (imaging and inferring) rather than just focussing on inferring. Her concern that her teaching was not going well was not reflected by her development in the components of transactional strategy instruction. Rather, it appeared to focus on a lack of understanding of an aspect of one of the components – the focus needs to be on the text (sixth component), not on the strategies. The texts that the teacher was using, such as *The Lion, the Witch and the Wardrobe,* did contain many powerful images, as well as many opportunities to infer. Once the teacher understood this, she demonstrated point 8 on Duffy's progress scale, and became creative and inventive.

The final term's observations contain many examples of creative application of R. Brown et al.'s (1996) components.[1] Firstly, the teacher continued to provide thorough explanations and models of effective comprehension strategies (second component). In order to explain how to infer, for example, the teacher used newspaper headlines as well as a book she was reading to the class, Roald Dahl's *Matilda*. When using headlines, the teacher showed the children a headline about the performance of a New Zealand golfer, Michael Campbell: "Cambo swings home", and talked to them about the inferring she had to do in order to understand why it was written in this way. "My background knowledge tells me that 'Cambo' sounds like 'Rambo' [explains who Rambo was]. He did some action. Why did they say 'swings'? I need to do some inferring. He swings because he is a golfer".

[1] The first of Brown et al.'s components is not referred to as it mentions the need for long-term strategy instruction over several years. As this intervention spanned only one year, this component did not apply.

When using an example from *Matilda*, the teacher gave the class an exercise to do. She asked the children to read two pages from the story in order to find out what problems Matilda had, how she felt about the problems, and how she found a solution to the problems. She gave each group three different coloured highlighter pens and asked them to highlight the parts of the text that referred either to the problem, her feelings, or the solution. Students then discussed, in pairs, how they had combined their background knowledge with what the author had stated in order to infer the answers to the questions. This original idea enabled every pupil to respond. The researcher noted high levels of student engagement on this task.

Also, R. Brown et al.'s (1996) third component (coaching students on an as-needed basis) was noted. The teacher was able to prompt students who faced a reading difficulty to use a previously mentioned strategy as well as the strategy currently being taught. For example, during an exercise on inferring, a pair of students read the sentence, "There was something to please every shopper in the display window: beanbags, wingbacks, and even a rocking model". Students were using this sentence to work out the type of inference they would use in order to answer the question, "What is the object?" The pair of students discussing the type of inference was having trouble understanding what the word *wingbacks* meant. The teacher prompted them to use a comprehension monitoring strategy (when you encounter a comprehension difficulty, either reread, read ahead, or ask for help) to work this out. They applied this procedure, looking at the context of the word in the sentence (rereading), and decided that a wingback must be a type of chair.

The fourth component of R. Brown et al.'s (1996) model of transactional strategy instruction mentions both teachers and students modelling the use of strategies for one another. This increasingly became a feature of the teacher's lessons as she would first

mentally model how she had used a strategy to solve a reading problem, and then ask students in the class to share their own experiences of when they had done the same. For example, in one lesson the teacher used a poem called *A Set of Instructions to be Used when Reading a Poem*, to mentally model how to form an image of the instructions. She asked children to use various signals for their five senses and display these as she read the poem in order to show how they were using their five senses to form images. She then modelled for them how she had used her five senses and her background knowledge in order to form rich images of the poem.

One of the students then shared how he had been reading a *Harry Potter* book the previous week and had had various images go through his mind as he was reading. The teacher praised the student for using the imagery strategy and particularly for changing the pictures he had in his mind while reading.

The fifth component of R. Brown et al.'s (1996) summary was also evident. The usefulness of the strategies was increasingly emphasised by the teacher as she talked about when and where various strategies could be applied. She began to link the strategies the students were learning to many other curriculum areas and topics. She used poetry to model the imagery strategy during observed lessons and informed the researcher that she also prompted students to use strategies during their 'poem of the week' time each Friday. She included conversations about various strategies when she read books to the class. This modelling of the wide application of strategies was reflected in comments made by the students. One student, when asked when he had used strategies the previous week, mentioned using comprehension monitoring to solve a maths problem. Another student interrupted the teacher while she was reading a listening comprehension test passage aloud to tell her about the rich images she was seeing in her head.

Finally, the sixth component of R. Brown et al.'s (1996) summary was also evident at this stage of the teacher's development. Much dialogue about the text was coordinated around the use of strategies. A number of parents mentioned to the teacher during teacher interviews that their children were talking about using strategies at home. When the teacher asked the students, at the end of the intervention, what they were good at, one student made the following comment:

> I am really good at using reading strategies like inferring. I need to do a lot of thinking as I read. The author had written a hidden message and has not mentioned it in words. I use it a lot in reading and it is helpful to me. Imaging is helpful when I can read and can make a picture in my head.

These observations of the lessons the teacher taught, and the comments made by students, confirm the teacher's observation of her growth in proficiency as a strategy teacher. They also confirm the research hypothesis that a teacher can be trained to successfully implement strategy instruction.

Teacher's Progress as Indicated by Student Interviews

Student interview data were collected to ascertain students' perceptions of the teacher's lesson aims. It was predicted that, as the teacher's ability to teach reading comprehension strategies increased, students of low, medium, and high ability would increasingly understand the declarative, situational, and conditional knowledge that were central to her teaching. Increased student understanding of the teacher's lesson aims would confirm the teacher's improvement in her ability to teach reading comprehension strategies as evidenced by the teacher interviews, researcher field notes, and lesson observations.

The first four lesson observations and teacher interviews indicated that the teacher was operating at point 4 of Duffy's scale and included only two of the six components of strategy instruction identified by R. Brown et al. (1996). It would be expected, therefore, that students at this stage would not have a well-developed understanding of the declarative, procedural, and conditional knowledge being taught. The average results for all ability levels confirm this assumption. Out of a possible score of 12, low ability students had an average score of 5.75, medium ability students 5.5, and high ability students 8.

At the beginning of the second term, during a period that spanned four lesson observations, the teacher appeared to have moved to point 6 on Duffy's scale and had included an additional component of R. Brown et al.'s (1996) six components. This was reflected in a rise in understanding of the central lesson aims for each group. The low ability students scored an average of 6.5, the medium ability students 8, and the high ability students 8.75.

The next points of progress the teacher faced were briefly feeling that she had 'hit the wall', and that she 'didn't quite get it yet'. These points are represented by only two lesson observations. The average scores for these lessons show the high ability students dropping off some (average of 7), and the medium ability students remaining static with an average of 8. Only the low ability students continued to rise in their understanding with an average of 7.5.

The final stage of the teacher's development represents her being 'creative and inventive' and including all salient components of strategy instruction identified by R. Brown et al. (1996). At this point (final four observations) the low ability students continued to rise with an average score of 8.5. The medium ability students fell slightly

with an average of 7.75, and the high ability students performed at their peak with an average of 9.25.

These patterns of (generally) rising scores confirm the research hypothesis that students will increasingly understand the declarative, procedural, and conditional knowledge central to strategy teaching as their teacher improves in her practice as a strategy teacher.

Conclusions of Qualitative Data

Analyses of the teacher interviews, lesson observations, and student interviews show an increase in the teacher's ability to effectively teach reading comprehension. She moved from feeling unsure about how to teach reading comprehension strategies, to feeling confident. Her feelings of competence are confirmed by classroom observations which indicate that she increasingly took ownership of the components of good strategy teaching. In addition, the rise in student awareness of the declarative, procedural, and conditional knowledge that the teacher was seeking to teach in each lesson show an increase in her ability to teach reading comprehension strategies.

In summary, qualitative analysis of teacher interviews, lesson observations, researcher field notes, and student interviews indicate progress in the teacher's ability to teach reading comprehension strategies.

These data also confirm the improved performance of the treatment group students as reported in the quantitative section. The teacher's ability to explain the metacognitive aspects of reading comprehension appeared to be at a high level at the time of post-testing, as demonstrated by the qualitative data. Competent explanations of metacognitive processing confirmed the treatment group students' superior performance on the IRA. In addition, the treatment group's confidence in using strategies, as shown

by the teacher's ability to apply strategies to many reading situations, and comments students made to their parents about strategy use, may also be a factor in the students' significant gain in confidence in comparison to the non-treatment control group. Student confidence to apply strategies may also be a factor in their marginally superior performance in standardised reading comprehension as measured by the PAT Reading comprehension test.

CHAPTER 5

Discussion

The discussion section will parallel the results chapter. Changes in student performance as indicated by the quantitative data will first be considered. Gains in the teacher's ability to teach reading comprehension strategies will then be linked to the treatment group's progress in metacognitive awareness of reading, confidence in reading, and reading comprehension.

For metacognition, the prediction that the treatment group would obtain significantly higher scores on the Index of Reading Awareness (Jacobs & Paris, 1987) was clearly supported. It would therefore appear that the teaching methods used to inculcate metacognitive awareness – mental modelling of cognitive strategies, motivation through the teacher's examples of personal strategy use, coaching students to use strategies, and making evident the declarative, procedural, and conditional knowledge associated with the three strategies taught – were associated with significant gains in metacognitive awareness of reading strategies as measured by the full scale scores of the IRA.

Of interest, however, are the significant interaction effects for two of the four subscales. Jacobs and Paris (1984) divided the subscales of the IRA into two sets of items with one set measuring self-management of cognition (Evaluation, Planning and Regulation), and the other knowledge of when and why particular strategies should be applied (Conditional Knowledge). The treatment group performed significantly better than either of the two control groups for the Planning subscale, and significantly better than the treatment-control group for Conditional Knowledge. It would thus appear that the teacher's competence in teaching the declarative, procedural, and conditional

knowledge associated with various strategies led to gains in both self-management and self-regulation of strategies.

The results in this study parallel those reported by other researchers (Duffy & Roehler, 1987; Duffy, Roehler, & Herrmann, 1988; Duffy et al., 1986; Jacobs & Paris, 1987; Paris & Cross, 1984) who found that classroom-based programmes of metacognitive instruction can improve children's awareness and understanding of reading strategies. Jacobs and Paris (1987) found that readers of varied ability benefit from such instruction, which is confirmed by the present study, which demonstrated a significant rise in the mean score for the treatment group.

This study may also help validate the IRA as a measure of metacognition in reading. Concerns about Jacobs and Paris's 1987 findings by subsequent authors (McLain, Gridley, & McIntosh, 1991) include the criticism that positive results could be attributed to an instructional programme designed to reflect items on the IRA. It was questioned whether the IRA adequately measured the construct of metacognitive reading awareness. Jacobs and Paris also mention this concern in their 1987 research:

> … the IRA reflects our conceptual framework of reading awareness and measures knowledge about some concepts that we believe are related to reading comprehension. These concepts were also the basis for the weekly lessons. Although it is important to connect definitions, measures, and interventions conceptually and operationally, there are other strategies and knowledge that may be just as important for effective reading. (p. 275)

Although there is overlap between the lessons taught in the Jacobs and Paris study and the present study, the lessons in the present study were not based on the IRA. Areas of overlap in teaching technique include instruction in the declarative, procedural, and conditional knowledge associated with the strategies, and coaching in strategy use.

Additionally, overlap in taught strategies include the inferring strategy, activation of prior knowledge, and summarising – the latter two being part of the 'reading non-fiction' strategy.

However, a major difference between the two studies lies in the scripted nature of Jacobs and Paris's lessons. Teachers in their study taught the ISL (Informed Strategies for Learning) programme, which consisted of 20 modules targeting planning for reading, identifying meaning, reasoning while reading, and monitoring comprehension (Adams, Treiman, & Pressley, 1998; Paris & Cross, 1984). The present study was modelled on the 'Direct Explanation' approach (Duffy et al., 1987), and 'Transactional Strategies Instruction' (R. Brown, Pressley, van Meter, & Schuder, 1996), in both of which teachers choose and implement strategies, and choose materials on the basis of identified student needs. The IRA would therefore appear to have wider application than Jacobs and Paris suggested.

The present research also adds an additional finding about Year 4 children's ability to learn metacognitive reading strategies through a less scripted approach. In their 1987 study, Jacobs and Paris comment that:

> ...our data indicate that awareness increases without special instruction. An instructional program such as ISL promotes reading awareness and increases knowledge about cognitive skills and strategies more than occurs without such instruction; however, children's understanding usually improves during the course of a school year. (p. 275)

They report that the Grade 3 treatment students in their study (equivalent to the Year 4 students in the present study) scored significantly higher on the IRA than the non-treatment Grade 3 students. In the present study a treatment group of the same age also scored significantly higher than control groups. This result indicates, similarly to

scripted approaches, that metacognitive instruction targeted to Year 4 students' needs results in gains in metacognitive awareness.

The results for standardised reading comprehension in the present study are also similar to those in other studies. These similarities will first be considered. Studies that did result in significant gains in reading comprehension will then be discussed in relation to the present study.

Results for standardised reading comprehension in the Paris et al. (1987) study and the present study are also similar, though the studies were of different duration. In the ISL programme, the teaching occurred over four months, after which a standardised paragraph reading subtest was administered. Control group students did make greater gains in reading comprehension as measured by the standardised test, but the gains were not significant. In the present study, gains in reading comprehension were also made and these were marginally significant.

Similarly, Duffy and his colleagues (Duffy et al., 1986; Duffy et al., 1987) conducted two studies that tested, among other things, the effect of reading strategy instruction on standardised reading. In the first study, teachers received professional development on how to be more explicit in their explanation of reading comprehension strategies. The study was conducted with students who were older than those in the present study, (fifth grade as opposed to an equivalent third grade), and included only students in low reading groups. However, the study was of similar duration to the present study, taking a total of six months. The results of Duffy et al.'s studies are similar to those of the present study. Teachers made gains in giving explicit explanations, but no significant differences in standardised reading comprehension were noted.

In the second of the two studies, teachers received professional development before teaching reading comprehension strategies to third grade low ability reading groups. Once again the intervention was for six months. However, this time, in addition to the strategy teaching, teachers in both treatment and control groups also taught students how to take standardised reading tests. Results once again showed that treatment group teachers were more explicit in explaining the mental processing involved in reading than control teachers. However, contrary to the previous study, students in the treatment group performed significantly better on a measure of standardised reading than control group students. The standardised measure used (the Stanford Achievement Test) included two subtests – word study and comprehension. When the gain in standardised reading comprehensions was further analysed, gains were found to relate to the word study subtest of the comprehension measure, rather than the comprehension subtest. Therefore this result is also similar to that of the present study.

Researchers (Duffy et al., 1986; Duffy et al., 1987; Paris & Cross, 1984) who found that reading comprehension strategy instruction did not result in significant gains on standardised measures of reading comprehension suggest several reasons for this. Firstly, all three studies question the ability of a standardised measure of reading comprehension to capture gains made in metacognitive reading awareness. Each study suggests that standardised reading comprehension tests are highly correlated with measures of intelligence and are therefore relatively insensitive to variations in curricula and particular experiences. Also, some of the strategic comprehension processes that were taught, for example rereading and paraphrasing (Paris & Cross, 1984), are too time-consuming in a standardised testing situation.

Others (Dole, Duffy, Roehler, & Pearson, 1991; Rayner & Pollatsek, 1989) agree that standardised tests may not be the best measures of reading comprehension

strategies. Dole et al. (1991) point out that the "achievement test performance on standardised tests of skill-based tasks ... are at best, marginally consistent with a cognitive view of comprehension" (Dole, Duffy, Roehler, & Pearson, 1991, p. 250). Rayner and Pollatsek suggest that in reading comprehension tests "most 'reading comprehension questions' tap many things besides your comprehension of the text" (Rayner & Pollatsek, 1989, pp. 317, 318). The fit of standardised reading comprehension tests in that study to the construct of reading comprehension strategy use, may not, therefore, have been satisfactory.

A second reason cited for non-significant gains in reading comprehension is the short duration of the intervention. Duffy et al. (1986, 1987) mention this as a factor, as they were dealing with low-group students who probably needed more than six month's intervention in order to apply strategies to real text. This was a particular factor in the 1986 study as teachers in that study admitted that they found strategy implementation difficult, and were more inclined to teach strategically when they were being observed. This led Duffy et al. to conclude that the strategies were probably not being applied outside of researcher-observed reading lessons.

A subsequent reading comprehension strategy instruction intervention did, however, result in significant gains in standardised reading comprehension. In a programme that has been described as 'Transaction Strategies Instruction' (Pressley et al., 1992), SAIL (Students Achieving Independent Learning) teachers, trained to directly explain and mentally model reading comprehension processes, taught reading comprehension strategies to second grade low ability students (R. Brown, Pressley, van Meter, & Schuder, 1996). This instruction was given to groups of six students (rather than the whole-class approach of the present study), and lasted for an entire school year. The strategy approach to reading was taught not only in reading time, but also across

other curriculum subjects throughout the school day. In this study, SAIL students in the treatment group made significantly greater gains on a standardised measure of reading comprehension than control group students.

The suggestion, therefore, that standardised measures of reading comprehension do not test gains in metacognitive processing does not seem to be true for the R. Brown et al. (1996) study. A difference, however, between this study and the previous study was the duration. The suggestion that students may need more than six months of reading comprehension strategy instruction before gains in standardised reading comprehension become evident may, therefore, have merit. The additional 3 to 5 months of instruction that the students in the R. Brown et al. (1996) study received, compared to the Paris and Cross (1984) and the Duffy et al. studies (1986, 1987), may have affected reading comprehension.

In relation to the present study, the findings from the above studies are of interest. Similar to the studies conducted by Paris and Cross, and Duffy and his colleagues, this study was only of six months duration. However, other factors may also have contributed to non-significant gains in standardised reading comprehension.

In the studies cited above, the treatment and control groups were homogeneous on pre-test scores of reading comprehension and word analysis. This was not so for the present study. At the pre-test stage, the treatment group was 3.22 points lower than the treatment control group on standardised reading comprehension and 4.05 points lower than the non-treatment control group. The latter difference was significant ($p < .05$).

Also, the teachers in the Pressley et al. (1992) study were all experienced reading comprehension strategy teachers, having taught using the strategy approach for three to six years. Though the teacher in the present study showed sound strategy teaching practices approximately one month before the post-tests were conducted, qualitative

data showed that she passed through stages of increasing competency up to this time. Hence, students in the current study did not receive the same sustained level of quality instruction as those in the Pressley et al. study. This may also have affected the students' reading comprehension results.

An additional measure in this study that was not included in many other studies of reading comprehension strategy instruction (R. Brown, Pressley, van Meter, & Schuder, 1996; Duffy et al., 1986; Duffy et al., 1987; Paris & Cross, 1984) was a measure of decoding ability. The results of this measure (PNT) may provide additional explanation as to why the gains in reading comprehension were marginal.

In line with the simple view of reading (Gough & Juel, 1991), reading is a combination of both decoding and comprehension. If decoding is not automated, there may be insufficient cognitive capacity left for comprehension of text (Pikulski & Chard, 2005). The treatment group's decoding scores were significantly lower than either of the control groups' scores at the time of pre-testing ($F = 9.73, p < .01$). Decoding scores at the time of pre-testing correlated highly with reading comprehension scores (.71 for the treatment group, .55 for the treatment control group, and .58 for the non-treatment control group, $p < .05$). Lower decoding scores would therefore appear to account for the lower reading comprehension pre-test score. At the time of post-testing, the decoding scores of the treatment group were still significantly lower than both the treatment control group ($p < .01$) and the non-treatment control group ($p < .05$). It would appear that lower decoding was a factor in the lower comprehension score.

However, despite the lower pre-test and post-test decoding scores, and despite the focus of this intervention being on the teaching of reading comprehension rather than instruction in decoding, the treatment group made significant gains in decoding over the course of the intervention in comparison to the non-treatment control group (mean

difference in gain scores of 4.16 $p < .05$). The treatment group also made slightly greater gains in decoding than the treatment control group (mean difference in gain scores .69), but this gain was not significant. This unexpected result may be due to increased reading mileage due to high levels of paired and teacher-led oral reading during strategy instruction.

In sum, the short duration of this study, the significantly lower pre-test scores for both decoding and comprehension, and the treatment group teacher's undeveloped ability to teach reading comprehension at the beginning of the intervention would appear to be factors in the lack of a significant gain in standardised reading comprehension for the treatment group. However, considering the gain in decoding over the course of the intervention, it could also be surmised that should this intervention continue for an additional three months, as in the R. Brown et al. (1996) study, students would eventually show significant gains in standardised reading comprehension. The addition of instruction in decoding for readers who have low decoding scores might result in even greater gains.

The significant gains noted in the treatment group's awareness of metacognitive strategies would lead to the expectation that they would be confident in using these strategies. According to Borkowski et al. (2000), children who know the metacognitive steps involved in a process are able to link success to internal factors – effort and task analysis. This, in turn, should lead to increased confidence (self-efficacy) when approaching reading tasks.

In addition, the teacher's ability to teach reading comprehension strategies as indicated by the qualitative results ought also to facilitate student confidence. According to various researchers (Borkowski, Carr, Rellinger, & Pressley, 1990; Borkowski, Chan, & Muthukrishna, 2000; Paris & Winograd, 1990; Pressley, Borkowski, & Schneider,

1989), teaching techniques that include making the positive effects of strategy use obvious – for example making the goals of strategy teaching clear, linking strategy use to appropriate tasks, making evident the steps involved in a particular strategy, carefully scaffolding student learning, and engaging in interactive dialogue – all contribute to students' motivation to use strategies. As these teaching techniques were noted in later lesson observations, it would be expected that students would be motivated to use the strategic processes with which they were familiar. This motivation should lead to increased practice of the strategies, which in turn should engender confidence. The finding, therefore, that the treatment group made gains in reading self-efficacy that were significantly greater than the non-treatment control group, supported the research hypothesis.

The non-significant gain made by the treatment group in comparison to the treatment control group was, however, contrary to expectations. Both these groups had similar initial levels of confidence (treatment group mean 23.13, treatment control group mean 23.59). The treatment group made greater progress than the treatment control group (gain score of 4.41 compared with 2.21), but this gain was not statistically significant. As self-efficacy appears to develop independently of one's performance levels in other areas (Bong & Clark, 1999), this result probably does not relate to the Numeracy Project (NumP) training that the treatment control group received. Rather, the increased confidence experienced by the treatment control group may be a result of their superior decoding ability.

These findings concur with the simple view of reading proposed by Gough and Juel (1991), viz. that the reading process is a combination of both decoding and comprehension. Automaticity in decoding frees up cognitive resources, allowing for comprehension to take place. Instruction in comprehension strategies to those who have

good levels of decoding should result in greater gains than for those who have not received reading comprehension strategy instruction. As students become metacognitively aware of both the strategies to use in order to make gains in comprehension, as well as the gains they are making, they may be expected to develop greater confidence in using these strategies, which should result in significant gains in self-efficacy. Hence, decoding ability would appear to be a fundamental prerequisite for gains in reading self-efficacy.

Also, though the treatment group teacher was proficient in her strategy teaching by the time of the post-intervention testing, the qualitative results indicated that this proficiency had not been evident throughout the intervention. Had the strategy teaching been highly proficient throughout the intervention, greater gains in confidence may have resulted.

In regard to the numeracy portion of the self-efficacy questionnaire, however, the NumP training that the treatment group received did result in significantly increased confidence in mathematics compared to the non-treatment control group. This result also confirms the findings of Bong and Clark (1999) that self-efficacy is subject specific, as significant gains in reading comprehension were not evident between these two groups.

The lack of a significant difference between the treatment control and treatment groups for numeracy self-efficacy, however, was also contrary to the research hypothesis. It is interesting to note that the difference between the treatment control and treatment groups for numeracy self-efficacy (1.63) is less than that between the treatment group and treatment control group for reading comprehension (2.20). This finding may be due to the treatment group's participation in the NumP project over the past three years. Although the treatment group teacher focussed particularly on the

reading comprehension intervention during the time of the study, she also continued to teach mathematics strategies. It would appear that the teaching of numeracy strategies was associated with gains in confidence for those in the third year of the project, but not to the extent of those who were in the first year, where teachers were receiving more intensive professional development.

In sum, results from the quantitative analysis show students have gained in their understanding of metacognitive processes, reading comprehension, and confidence to approach reading tasks. Many of these gains could be associated with gains noted in the teacher's ability to teach strategies as indicated by the qualitative data.

Analysis of the interviews conducted with the teacher at the beginning and end of the intervention, as well as comments recorded in the researcher's field notes, indicated that the teacher progressed from focussing on modelling process into content (point 4 of Duffy's (1993b) points of progress) to being creative and inventive in her strategy teaching (point 8). This progress is of particular interest when compared with findings from a five-year study conducted by Duffy (1993a) where he researched, among other things, the difficulties teachers encountered when learning to be proficient strategy teachers.

Of interest to the present study are Duffy's comments on the progress of two of the four teachers he studied, both of whom closely matched the treatment group teacher. Described as 'perceptive and conscientious' (Duffy, 1993a, p. 243), 'Barbara' had taught for 25 years and 'Candice' for 18. Both teachers were in the second year of Duffy's professional development programme which included workshops, focus group meetings, and in-class coaching and modelling. Similarly, the treatment group teacher in the present study had 23 year's teaching experience and was in the second year of a

professional development programme that included all of the components in Duffy's programme.

Although Duffy did not rate Barbara or Candice on his nine-point scale, the comments he makes about both their teaching and pre-lesson interviews during their second year in the programme give sufficient information to rate their progress. Lesson observations and interviews with Barbara in the second, third, and fourth months of her teaching would seem to place her at point 2, a point at which "only the teacher was aware of the strategies – the students were not" (Duffy, 1993b, p. 114). For example, Duffy comments that, in a lesson intended to teach about using context clues to figure out unknown words, Barbara "had students list three things they had learned about Japan and then draw a picture about those three things" (Duffy, 1993a, p. 241). When students were interviewed after this lesson they had only vague ideas about when they would use the strategy.

Interviews and observations of Candice in her second month also indicate a point 2 rating, and at the end of the year she appears to be at point 3. Duffy describes point 3 teachers as beginning to make students aware that there are strategies. Commenting about Candice's progress at the end of the year, Duffy noted that she had moved from using basal texts to 'real' books (Duffy, 1993a). However, this move to make her strategy teaching more authentic still did not result in students being aware of when they would use the prediction strategy that had been the focus of the lesson.

These findings contrast with the treatment teacher in the present study, who was rated at point 4 in her second month of teaching and at point 8 by the end of the year. The more advanced progress of the treatment group teacher may be due to the greater amount of researcher modelling in the present study. In addition, the teacher in the present study was accustomed to the varied approaches to teaching reading that have

been developed in New Zealand in contrast to the basal approach adopted in the schools where Duffy's study was conducted.

The current study included a strong researcher-modelling component where the researcher modelled lessons in the teacher's classroom. The treatment group teacher had observed 14 half-hour modelled lessons in her own classroom during the first year of professional development, and four modelled lessons in classrooms in other schools in the second year. This modelling was included in response to findings by El-Dinary and Schuder (1993) that teachers were reluctant to attempt strategy teaching on their own, as they lacked sufficient modelling of the teaching processes involved. Duffy's 1993 research also included researcher modelling, but it would appear there was less of it, and that it was less structured than in the present study. Duffy and his colleagues visited classrooms once a fortnight and 'sometimes' demonstrated lessons (Duffy, 1993b). It would appear that an even greater focus on in-class modelling may have resulted in more rapid progress for the treatment teacher.

Another difference between the Duffy (1993a) study and the present one is the context. In points one and two of Duffy's (1993b) scale, reference is made to the difficulty teachers have in distancing themselves from basal textbook prescriptions. This is not a difficulty for New Zealand teachers. In *Effective Literacy Practice in Years 1 to 4* (Ministry of Education, 2003), a book supplied free-of-charge to all New Zealand schools as "the key reference for professional development programmes" (p. 6), the national antipathy towards basal programmes is emphasised. On page 21, it states "There is … no place for programmes with prescriptive methods and materials or for pre-determined, recipe-style literacy activities that claim to fit the needs of all learners" (Ministry of Education, 2003). Hence, New Zealand teachers are trained to be adaptive and use a variety of real-life texts instead of a lock-step pre-specified programme.

Teacher expectations that the reading programme will be non-prescriptive may well prove beneficial to acquiring the flexibility needed to be an effective teacher of reading comprehension strategies.

In sum, the teacher interviews and researcher's field notes indicate a faster increase in teacher competence to teach reading comprehension strategies than that noted in other studies. The more rapid progress made by the teacher may be due to the inclusion of researcher-modelled lessons as part of the professional development approach. Also, the unified, non-prescriptive, and flexible nature of the teaching of reading in New Zealand may provide a better fit with reading comprehension strategy teaching than the prescriptive approach adopted in some classrooms in the United States, leading to a faster uptake of the teaching techniques in this country.

Observations of the teacher's classroom teaching confirmed the research hypothesis that a teacher could be successfully trained to implement reading comprehension strategies in a whole class situation. Lessons observed towards the end of the intervention showed all of the relevant components of good strategy instruction identified by R. Brown et al. (1996). The implications of this finding for professional development, gains in metacognitive awareness, and whole class instruction, are of interest.

In a study of the teaching of cognitive and metacognitive strategies at Benchmark School, 31 of the 33 academic teachers were interviewed (Pressley et al., 1991). Responses indicated that the teachers there were also aware of all the components of good strategy instruction. This finding was linked to the professional development approach at Benchmark School which included interaction with other teachers, reading professional articles, monthly in-service professional development with outside experts,

and observation of other teachers. The training the Benchmark teachers received was ongoing throughout their employment.

The similar findings of both the Pressley et al. (1991) and the current study confirm the need for professional development to be ongoing over several years. In the study conducted at Benchmark School it was noted that teachers who had only taught at the school for a short time were much less knowledgeable about the components of strategy teaching than those who had been there for two or more years. The evidence of the teacher's development in the components of strategy instruction towards the end of the current study confirms the need for professional development to be sustained.

Findings from the present study also have implications for the training of metacognitive processes. The components of strategy instruction identified by R. Brown et al. (1996) were linked to an increase in the knowledge students had about effective reading strategies as compared with control group students who had not received strategy instruction. The significant gain in IRA scores of the treatment group students in this study is consistent with the findings of R. Brown et al. (1996).

The differences between the R. Brown et al. (1996) study and the present study are, however, also of interest. Teachers in the R. Brown et al. (1996) study were teaching groups of six second-grade (equivalent to Year 3 students in New Zealand) low-achieving readers. The teacher in the present study, in contrast, was teaching her entire class. The significant gains in a measure of metacognitive awareness, therefore, suggest that such instruction can be successfully taught in a whole-class situation.

In addition to the information gained from teacher interviews, researcher field notes, and lesson observations, interviews conducted with low ability, medium ability, and high ability students after each observed lesson indicated that they were becoming increasingly aware of the declarative, situational, and procedural knowledge necessary

for strategy use. The increase in knowledge for all ability groups was linked to the teacher's increasing confidence and ability to teach the strategies.

These results are interesting when compared with similar studies. In two studies conducted by Duffy (Duffy et al., 1986; Duffy et al., 1987), the ability of students to understand the declarative, procedural, and conditional knowledge their teachers communicated during reading comprehension strategy instruction was also examined. In the first study, teachers of low-group fifth grade students received six months of professional development in reading comprehension strategy instruction. All elements of professional development which were included in the present study were also included in Duffy's (1986) study. Four lesson observations were conducted one month apart, beginning in the third month of the professional development. After each observation, five low reading group students were interviewed and asked identical questions to those asked in the present study. The students were rated on the identical scale to the present study (0 to 4 scale) and could score a maximum of 12 points. The five responses were averaged and ranged from 6 to 7. As control group students were also interviewed, significant improvement was noted in the treatment group.

In the second study (Duffy et al., 1987), teachers of third grade students were given six months of professional development in reading comprehension strategy instruction, again including all the elements of professional development included in the present study. Six student interviews were conducted monthly, beginning with the first month of professional development. Once again, five students were interviewed, and scores were averaged. Scores ranged from 4 to 6, and were significantly different from control group students' scores.

Student interviews in the present study yielded results higher than either Duffy's 1986 or 1987 studies. Low group students' scores ranged from 3 to 9, middle students

from 3 to 10, and high group students from 3 to 11. As mentioned previously, the treatment group teacher's superior knowledge of the components of reading comprehension instruction as compared to the teachers in the Duffy studies (1986; , 1987), may account for these greater student gains.

To summarise, the implemented strategy instruction resulted in improved metacognitive abilities and reading self-efficacy for the trained students. In addition, students made marginal gains in standardised reading comprehension measures. The failure to achieve a strong gain in standardised reading comprehension may be due to the relatively low decoding ability of the treatment group at the outset of the study. Poorer decoding skills of the treatment students may have limited their ability to make greater gains in reading comprehension skills following the metacognitive strategy instruction.

The second major question was answered affirmatively. By means of intensive tutoring in the theory underpinning reading strategies and the teaching techniques that accompany strategy instruction, researcher modelling, and focus groups where teachers met to discuss difficulties and successes in implementation, one teacher was trained to successfully implement reading comprehension strategy instruction.

CHAPTER 6

Conclusion

The present study builds on findings from previous research and provides unique findings on how reading comprehension can be taught to an entire class. In addition, the study advances current understandings of professional development methods for teachers. As such, this study provides a research base for designing and implementing effective reading comprehension instruction. As a consequence of these insights into both whole-class instruction and teacher professional development, findings from this study, together with the recommendations for greater attention to children who have word decoding weaknesses, could be used as the basis for a national programme in reading comprehension instruction.

This study was informed by research which indicated that training in reading comprehension strategies that included the declarative, procedural, and conditional knowledge associated with the strategies led to comprehension gains for students of low ability. It was surmised that the interventions leading to the gains experienced by low ability students would also be beneficial for students of varying ability.

The results of this study indicate that Year 4 students in a mixed ability class can make significant gains in their understanding of strategic processes as a result of training in reading comprehension strategies. The treatment group's standardised reading comprehension improved in contrast to that of the control groups', as did the trained students' confidence that they could perform various reading tasks. Significantly lower word decoding skills for students in the treatment group may have limited their potential to benefit from the reading comprehension strategy instruction.

A second aspect of reading comprehension instruction that was addressed in this research was the training of teachers to implement reading comprehension strategy instruction. Of interest was whether the methods that had been used in previous training – intensive tutoring in the theory underpinning reading strategies, and the teaching techniques that accompany strategy instruction, researcher modelling, and focus groups where teachers get together to discuss difficulties and successes in implementation – could also be used to train a teacher to successfully implement reading comprehension strategies with her entire class.

The outcomes of this study suggest that the teacher who was trained using methods found to be helpful in previous studies became a successful teacher of strategies over the course of the intervention. The faster rate of progress by the teacher in this study may be due to the less scripted nature of reading education in New Zealand as compared to the basal programmes commonly used in the classrooms studied in the United States.

Limitations

Although these findings augment and build on previous research, this study was limited in various ways. Firstly, the study only reports on the training and practice of one teacher. Although 14 teachers had received training in the first year, only two teachers were able to continue as part of the research sample the following year. The personal circumstances that led to the resignation of one of those teachers at the end of the first term were unfortunate. The positive results obtained by the remaining teacher may not be readily generalisable. She may have been a more proficient teacher than those in the control groups (she was more experienced than most of the control group teachers as per Table 3), and may also have been more proficient than the remaining 13

teachers who received training in the first year. Future studies, which included a larger sample of teachers, would provide additional weight to the findings of this research.

Secondly, the groups were not equal in regards to their decoding ability. The inferior decoding ability of the treatment group almost certainly influenced the results in suppressing the effects of the intervention. Future studies should take into account any significant decoding ability differences. In addition, inclusion of a comprehension strategies plus a decoding improvement programme would potentially be beneficial for those students who have particular decoding problems.

Thirdly, this study deliberately focussed on a whole-class instructional approach to the teaching of reading comprehension strategies, as research suggested that students of varying ability could benefit from such instruction. Given the varied entry-level decoding abilities within the treatment group, however, a differentiated instructional approach might have been more effective. Subsequent researchers could investigate whole-class teaching which targets the needs of ability grouped students.

Fourthly, the samples were not equal in terms of ethnic composition. As samples were selected on the basis of school size, decile rating, and participation or non-participation in the Numeracy Project, sample characteristics were not able to be controlled. Although the greater number of Asian and Maori students in the non-treatment control group in all likelihood did not affect the outcomes of the study, (the standard deviations on all tests for the non-treatment control group are not markedly higher than those of either of the other groups), it is possible that the uneven ethnic mixtures between the groups did affect results. Future studies which controlled for ethnic composition would confirm or otherwise the effect of ethnicity on reading comprehension results.

Fifthly, the intensive nature of the intervention may limit the generalisability of this study to future teacher training. Although previous research shows that teachers take a considerable period of time to learn the effective use of strategies (Almasi, 2003; Duffy, 1993a, 1993b, 2003; Duffy et al., 1987), designing a programme that can be run over a shorter period of time and that is less intensive for both the teacher and the professional developer may result in higher participation rates and adoption by teachers.

Another aspect of this intervention which may benefit teachers in the future is a focus on transferring the learnt strategies to commonly assessed reading tasks. The difficulty of using commonly assessed reading tasks in the present study was their lack of standardisation. However, future studies may be able to address this by including such measures as running records in the data collection process.

Further Considerations and Recommendations

Several considerations that arise from this study are worth noting. Firstly, this study focussed on reading comprehension, which is an aspect of one's ability to read. According to the *simple view* of reading, (i.e. R = D x C, i.e., reading equals decoding times comprehension (Gough & Juel, 1991)), reading also involves decoding. Although treatment group students' decoding improved during this study, the treatment group's significantly lower levels of decoding ability evident at the beginning of the study suggested that their reading comprehension may have improved more if this aspect had been addressed simultaneously.

The strategic approach to teaching is not limited to comprehension instruction. Some of the leading proponents of reading comprehension strategy instruction also suggest ways to teach decoding using a metacognitive strategy approach (Adams, Treiman, & Pressley, 1998; Almasi, 2003; Duffy, 2003; Gaskins, Downer, Anderson, &

Cunningham, 1988). A combination of both metacognitive decoding instruction for those with poor decoding ability, and reading comprehension strategy instruction, would be worthy of further research. A combination of these factors may result in greater gains in reading comprehension for treatment group students.

Secondly, the focus of this study was on using a strategy approach only to enhance reading comprehension, which was measured during the time of formal reading instruction. Being metacognitive about one's thinking, however, can be applied to many other areas, including mathematics (Pressley, 1986), and memory (Pressley, 2000a). In this study, although one of the control groups had received instruction in strategies that could be used during mathematics, these strategies did not appear to have been applied to the understanding of text, as shown by significantly lower scores on the IRA for the treatment-control group.

While at Benchmark School, a school for able students who underachieve mainly in reading, the researcher noticed that the strategy approach was gradually being integrated into all subject areas. The school administration viewed this as an essential step in assisting students to be adaptive in applying appropriate strategies to any learning task. Teachers of science, social studies, mathematics, and art, therefore, all aimed to teach students the particular strategies that they could employ, and how they could use them.

As the present study found that strategy instruction used for assisting poor readers could also be used profitably for assisting readers of varying ability, this wider application of strategies to all subject areas could also be also be beneficial for all students. Further research could investigate training teachers to apply a strategic approach across various disciplines to assess whether this would result in improved achievement.

Thirdly, this study has implications for professional development of teachers. In 1998 the New Zealand Ministry of Education began a national project to address the poor mathematics achievement of New Zealand students in the 1997 Third International Mathematics and Science Study (TIMSS) (Higgins, Parsons, & Hyland, 2002). A major focus of the Numeracy Project (NumP) was to teach students the cognitive strategies associated with mathematics (Ministry of Education, 2005a). The professional development method used included tutoring in the theory underpinning mathematics strategies, and the teaching techniques that accompany strategy instruction, facilitator in-class modelling, and focus groups. To date, the findings of this project indicate that students have improved in their understanding of numeracy strategies as a result of instruction in mathematics strategies (G. Thomas & Tagg, 2004).

As the current research used similar professional development procedures to those in the NumP project, and also resulted in gains for students, a national project to train teachers to implement reading comprehension strategies in whole-class situations may be worthy of consideration. The Ministry of Education has done some work in this area already, with the introduction of the Literacy Development Project in 2004. In this project, 42 schools are currently receiving professional development in how to teach reading comprehension (Ministry of Education, 2006). The practices being used to facilitate this professional development may, however, lack the necessary theoretical underpinning and coherence that characterise the Numeracy Project. General comments such as "learning is best done on site with other teachers", and "there was an expectation that these changes at both the classroom and the school-wide level would take time" (Ministry of Education, 2006, p. 8) are made, but little detail as to the actual processes used by professional developers is provided. The methods used in the current research may well be of benefit to those involved in this project.

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Appendix A

Form For Classroom Teacher Observation of Researcher-modelled Lessons

Teacher being observed _____

Teacher observing _____

Date _____

Strategy being observed _____

Please put tally marks in the boxes below as you observe the lesson.

Please add any additional comments below

TEACHER TALK				STUDENT TALK AND BEHAVIOUR			
Explains what a strategy is or how to use it	Praises a student for using a strategy or cues a student to use a strategy	Asks a question (Try to indicate LO, MO, or HO)	Corrects behaviour	Student answers teacher's question	Student responds to another student	Student talks to another student and is off task	Student appears inattentive

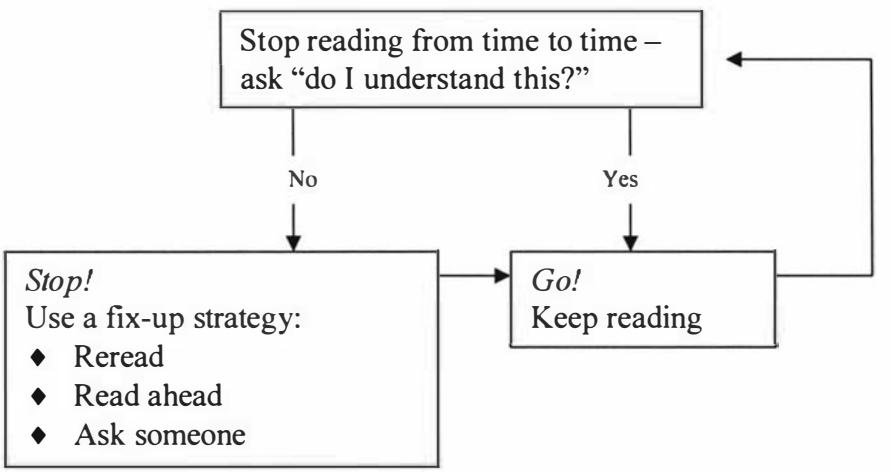
Appendix B

Lesson 1 – Comprehension monitoring (28 April 2004)

Materials

- 27 stop and go tags
- 'Reading must make sense' banner
- Chart of comprehension monitoring strategies:

Comprehension monitoring



- Vocabulary sheets
- Montgomery Boice book
- 27 copies of "What is a bee?" (Nature library)

INTRODUCTION

Explain to the children the reason why I am there and that I will be helping them to better understand what they read by teaching them some 'strategies'. Ask them to suggest what a 'strategy' might be. Explain that it's planned thinking to get a job done. When we're reading, this refers to the things we need to do in our heads to help us understand what we read. Tell the children that I will be in their classroom about once a week, either to teach them a strategy or to have a look at how they're getting on using strategies while they read.

Explain that the first strategy we are going to be using is recognising when what we are reading does not make sense and using particular strategies to help us make sense of what we read. Explain that these strategies are what expert readers do when they don't understand what they are reading.

What we all know about reading

- Show the banner 'reading must make sense'. Explain that this is very important. As readers it is their job to demand meaning from text.

Vocabulary introduction
Explain why vocabulary is introduced prior to reading – to recognise words in the reading and to practise decoding. Coach the children in the decoding and understanding of the following words:

Antennae – A bee has a pair of *antennae* to smell flowers and to feel.

Proboscis – A bee uses its tongue, or *proboscis*, to suck up water, nectar and honey.

Regurgitate – Then they spit out, or *regurgitate,* the nectar into a cell.

READING STRATEGY – COMPREHENSION MONITORING
What strategy are we learning?
Comprehension monitoring (display flowchart on whiteboard). Comprehension monitoring is stopping and thinking whether what we are reading makes sense or not. If it doesn't make sense we need to think about why this is and use a strategy to help us understand it better.

Why is the strategy important?
- It helps you maintain your attention while reading
- It helps you know when you need to use strategies to enhance your understanding

When can we use this strategy?
Continually as you read

How do we do the strategy?
Refer to the flowchart on the board (under *materials* above)

Personal example
At the moment I am running a class for the women at my church called "Women and Theology". This means I need to read some quite difficult books and teach the women at our church how to read them too. Over the holiday break I read this book (show 'Montgomery Boice' book) and I used comprehension monitoring all the time. I stopped and thought about whether or not I understood and often looked back through the text, or looked forward to help me understand what I was reading. Sometimes I also asked my husband for help.

GUIDED READING AND DISCUSSION OF TEXT
Survey the text and predict what we think it will be about
Now, let's have a look at this text ("What is a bee?"), and think about how we might survey it. For starters, I know that the front and back cover and contents page are very important things to look at when surveying a text. When I look at the front and back cover of this book the title tells me that the book is going to be about what a bee is. The back cover of this book only tells me which collection the book belongs to.

The contents page tells me what the main topics are that the book covers. *Go over these and comment briefly.*

Now I'm going to flick through the book to get a feel for what it's about. *Ask the children to do this too. Ask them for their suggestions.*

Activating background knowledge

Now that we've surveyed the text, the next thing we need to do is think about what we already know about the topic that the text is about. That way we can think about what we know while we're reading and compare our knowledge with what the text says. We need to think about what we know about bees. *Write this word on the board and ask children to activate their background knowledge. Write their activated knowledge around the words.*

Set a purpose for reading

Now that we've surveyed the book and thought about what we already know about the subject, it's time to decide on a purpose for reading. Well, during the holidays our friend who is a beekeeper told us a lot about what he does with his bees. I'm interested to find our more about bees so that I can talk to him about it next time I see him.

Comprehension monitoring

Introduce 'stop' and 'go' tags

Explain that as we read it is important to stop and think about whether the words and pictures make sense to us. In order to help us with this we are going to use our 'stop' and 'go' tags. We're going to read a section, and if we think we understand it all we're going to use our 'go' tags. If we don't understand we're going to use our 'stop' tags. (Refer to the places on the flow chart where these words are). We'll just lay these out on our desks (either one or the other) to indicate whether or not we understand.

Mental modelling

Read pages 2 and 3 aloud, comment on any activated background knowledge. Well, I'm going to use my stop card here. I really don't get that bit about social and solitary bees. My beekeeper friend told me all his bees live in a hive – not by themselves. Now, what could I do to help? I could reread this part, but in this case I don't get any further information from doing this. I could also read ahead. I'm just going to flick through the book and see if there is any information on solitary bees. Aha – here it is! Page 22 gives me some more information on solitary bees. I don't need to worry then, I'll learn more about them when I get there.

Read pages 4 and 5 aloud, comment on any activated background knowledge. Now, I think the best strategy to use here would be to read these things one at a time and then look at the picture and find the number to make sure I understand it. I don't think I was stuck on anything here, so I'm going to use my 'go' card.

Read pages 6 and 7 aloud, comment on any activated background knowledge. Now, I'm afraid I'm going to have to use my stop card again. I just can't remember where the bee's honey stomach is. I know what to do to fix this one though, I need to look back in the text and check out that diagram on page 5.

Read pages 8 and 9 aloud, comment on any activated background knowledge. Ask the children to display their stop and go cards and help them to use strategies if they get stuck. Repeat process throughout the book.

CONCLUSION

Recap on what we have covered and the strategy approach.

Appendix C

Lesson 4 – Activating prior knowledge (19 May 2004)

Materials

- 'Reading must make sense' banner
- class set of School Journal Pt 1 No 2 2002 (worm wise)
- Vocabulary (write up on whiteboard)
- Laminated cards of the steps in comprehension monitoring:
    - Look at the title, pictures, headings, or chapter titles in the text to gain an idea of what it is about.
    - Think about what you already know about the topic.
    - Sometimes it helps to write down what you already know about the topic.
    - As you read, try to make connections between what you know about the topic and the new ideas in the text.

INTRODUCTION

Review why I am coming in. **Ask students who has used the comprehension monitoring strategy outside of class time.**

What we all know about reading

- Show the banner 'reading must make sense'. Explain that this is very important. As readers it is their job to demand meaning from text.

Vocabulary introduction

Explain why vocabulary is introduced prior to reading – to recognise words in the reading and to practice decoding. Coach the children in the decoding and understanding of the following words:

underfelt – These were big, wooden boxes with covers made of woollen *underfelt*.

fertiliser – "It makes really good *fertiliser* for the garden."

READING STRATEGY – ACTIVATING PRIOR KNOWLEDGE

Explain to the children that there are many strategies that we can use to help us as we read. Comprehension monitoring is only one of them. Because they have grasped that one so well, we are going to move onto another strategy that can help us while we are reading.

What strategy are we learning?

Activating prior knowledge. This means thinking about what you know about the topic of the text. What you already know about the world can help you understand what you read. As you read you should continually try to make connections between what you know and the new ideas in the text.

Why is the strategy important?

- It helps you prepare for reading.
- It helps you to focus your attention while reading.

When can we use this strategy?

If done before you read it will help you anticipate what the text will be about which will help you set purposes for reading and make predictions. If done while you read it will help you update and revise your predictions, and it will help you set new purposes. If done after reading it will help you evaluate and monitor how well you understood the text.

How do we do the strategy?

Have the following points on cards

- Look at the title, pictures, headings, or chapter titles in the text to gain an idea of what it is about.
- Think about what you already know about the topic.
- Sometimes it helps to write down what you already know about the topic.
- As you read, try to make connections between what you know about the topic and the new ideas in the text.

Personal example

At the moment I am doing a lot of reading about how we understand what we read. To help me understand what I am reading I often look through the book before I read it and glance at the headings. Then, while I am reading I think about what I already know about the topic I'm reading about, and I make notes in the margin to help me tie the new things I am learning to things I already knew.

GUIDED READING AND DISCUSSION OF TEXT

Survey the text and predict what we think it will be about

Now, let's have a look at this text ("Worm wise"), and think about how we might survey it. In order to survey the text we need to look at the title and the pictures and see what we can predict the text is going to be about.

Think about what we already know about the topic

Now that we've surveyed the text, the next thing we need to do is think about what we already know about the topic that the text is about. That way we can think about what we know while we're reading and compare our knowledge with what the text says. We need to think about what we know about worm farming.

- *Write these words on the board and ask children to activate their background knowledge. Write their activated knowledge around the words.*
- *Ask children to reflect on their initial associations – "what made you think of ... "*
- *Ask children if they wish to change any of their ideas as a result of the preceding discussion*

Making connections between what you know about the topic and the new ideas in the text

Mental modelling

Read pages 17-18. Stop and muse aloud about the background knowledge the children have generated.

Repeat this process reading each of the remaining pages one at a time.

CONCLUSION

Recap on what we have covered and the strategy approach.

Appendix D

Term 3 Lesson 1 – Vocabulary (20 July 2004)

Materials
- Copies of words and definitions on cards

INTRODUCTION
Review why I am here. Talk about what a strategy is and how it can help our reading.

What we all know about reading
- Show the banner 'reading must make sense'. Explain that this is very important. As readers it is their job to demand meaning from text.

Introduction
Explain to the children that we are going to be reading about volcanoes this term. This means we are going to be doing a lot of reading in non-fiction texts (talk about what non-fiction texts are). Discuss the fact that one of the difficulties of reading non-fiction text is that there are often words in the text that we don't know the meaning of. In order to deal with this difficulty, we are first going to look at tricky words we might come across in the readings we will be doing in the next little while, and what they mean. Encourage attentiveness by promising that there'll be a game with these words at the end of the session.

Vocabulary introduction
Explain why vocabulary is introduced prior to reading – to recognise words in the reading and to practice decoding. Discuss the meanings of the words *active, dormant, extinct, magma, lava, crater, plates, mantle, core, crust,* using the procedure below:

1. Find the word in the text. Show the definition on card.
2. Ask a question using the word.
3. Present an example or use of the word in a sentence.
4. Present examples or non-examples in random order and ask students to identify whether it is an example or non-example and why.

1. active – When a volcano is 'alive', erupting or giving out gases, fumes, lava, ash and other substances.
2. Could an active volcano produce lava?
3. The active volcano threw out huge lava bombs.
4. *Examples or non-examples (pair-share):*
    a. During the time the volcano was active, many cars were covered with ash.
    b. People were very scared to climb the active volcano, in case they got hurt.
    c. When the volcano was active, many people built houses on its slopes.

1. Dormant – When a volcano is quiet or 'asleep', but it could erupt at any time.
2. Is a volcano that is belching out smoke dormant?
3. Many volcanoes are dormant, which means they are sleeping.

4. *Examples or non-examples (pair-share):*
    a. Many people lived happily on the slopes of Mt Tarawera when it was a dormant volcano.
    b. Lava flowed furiously out of the dormant volcano.
    c. The dormant volcano produced huge clouds of ash.

1. Extinct – When a volcano has not erupted for a very long time, and it had 'died' and will never be active again.
2. Could an extinct volcano produce lava?
3. The extinct volcano formed a beautiful mountain that rose above the village.
4. *Examples or non-examples (pair-share):*
    a. Many people lived on the slopes of the extinct volcano.
    b. People were very scared to climb the extinct volcano, just in case it erupted.
    c. If you put your hand on the ground at the top of an extinct volcano, the ground would be hot.

1. Magma – Rocks and minerals which are under the ground and which are so hot that they are melted or molten, so they can flow.
2. Could magma burn your skin?
3. The magma flowed out of the active volcano.
4. *Examples or non-examples (pair-share):*
    a. Hot magma rises through cracks in the earth's crust.
    b. A volcano erupts when magma escapes from inside the earth.
    c. He held the magma in his hand and thought it felt like an ice cube.

1. Lava – Rocks and minerals which come out of a volcano and which are so hot that they are melted or molten, so they flow.
2. Could an extinct volcano produce lava?
3. The lava flowed out of the top of the volcano and down its slopes.
4. *Examples or non-examples (pair-share):*
    a. When magma reaches the earth's surface it is called lava.
    b. The lava was deep inside the volcano.
    c. Lava can destroy crops.

1. crater – The hole at the top of a volcano where the main vent brings magma to the surface.
2. Could you see the crater in a volcano when you fly over it?
3. The volcano's crater contained a lake.
4. *Examples or non-examples (pair-share):*
    a. The crater was pointy, like an upside-down ice-cream cone.
    b. People swam in the warm crater lake
    c. Lava poured out of the crater.

1. plate – One of several large fragments that make up the Earth's surface.
2. Can plates be under the ocean? *Yes, the ocean floor is part of the Earth's surface.*
3. The Earth's crust is broken into several plates, like a cracked eggshell.
4. *Examples or non-examples (pair-share):*
    a. The earth's plates are able to move.

   b. There are cracks between the Earth's plates.
   c. The Earth's crust is made up of one big plate.

1. core – The centre of the Earth.
2. Is the core of the Earth inside the mantle?
3. The core of the Earth is also hot.
4. *Examples or non-examples (pair-share):*
   a. The core is inside both the mantle and the crust.
   b. The man found the core of the earth when he dug in his garden.

1. mantle – The part of the earth that lies between the crust (at the surface) and the core at the centre of the planet.
2. Is the mantle in the middle of the earth?
3. The mantle of the earth is quite solid and very hot.
4. *Examples or non-examples (pair-share):*
   a. The man could see the mantle of the earth when he dug his garden.
   b. The mantle is made of molten rock and is about 2,900 kilometres thick.

1. Crust – The outermost layer of the Earth, which is mostly solid, and which is very thin compared to the whole Earth.
2. When you dig a hole, have you dug into the Earth's crust?
3. The magma burst through the Earth's crust and became lava.
4. *Examples or non-examples (pair-share):*
   a. The planet on which we live is like a huge fiery ball of hot molten rock, surrounded by a few kilometres of cool hard roc – the crust.
   b. The Earth's crust can be hot.

SUGGESTED FOLLOW-UP ACTIVITIES

- Hand out cards and definitions to different children. Get the children to pair up with correct word and definition.
- Have the children search through books to find pictures that illustrate the above words. Draw the pictures and stick them next to the words.
- Arrange the words and pictures so that they are categorised.
- As a free time activity, children can take down words, definitions and pictures and match them all up.
- Review several of these words before each reading session and refer to them during reading. Add to the list if the children note difficulty with other words.

Appendix E

Term 3 Lesson 2 – Note taking (21 July 2004)

Materials

- Class set of readings for reading 2 (pgs 4-12 of *Volcanoes* by Dalgleish)
- One copy of the above on OHT
- Copy of the 'reading non-fiction' strategies on laminated cards:
    - Survey the text for the topic and organisation
    - Activate your background knowledge and make a prediction
    - Choose or have in mind a big idea or question to research
    - Read the section and take notes that relate to your purpose question.
- Copies of words and definitions on cards
- Large jig-saw
- Reading 36
- OHP
- Copy of above book (Dalgleish)
- OHT pens

INTRODUCTION

Review why I am here. Talk about what a strategy is and how it can help our reading.

What we all know about reading

- Show the banner 'reading must make sense'. Explain that this is very important. As readers it is their job to demand meaning from text.

Vocabulary introduction

Review the words plates, magma, lava, dormant, and extinct.

READING STRATEGY – READING NON-FICTION AND NOTE TAKING

What strategy are we learning?

How to read non-fiction. (display flowchart on whiteboard)

Why is the strategy important?

Non-fiction text is different than fiction. We need a strategy to help us focus on, understand and remember the most important information.

When can we use this strategy?

Whenever we read non-fiction.

How do we do the strategy?

Refer to the flowchart on the board (under *materials* above)

Personal example

Talk about how I took notes on reading 36.

GUIDED READING AND DISCUSSION OF TEXT

Survey the text for topic and organisation

Now, let's have a look at this text and think about how we might survey it. *Show the children the book and have a good look at the front cover and words. Read the words*

on the back cover. Show the contents page. Next hand out pages 4-12 and survey them. Point out that there is a lot of organisation here. Each page has its own heading which tells us what the page is going to be about. There are also diagrams on each page. These will help us to understand the text.

Activating background knowledge and make a prediction
Ask the children what they know about how volcanoes are formed.

Choose or have in mind a big idea or question to research
Tell the children we are going to look at the following question:
"What is a volcano?"

Read the section and take notes that relate to your purpose question.
Show the children the jig-saw and talk about how it is similar to what authors do when they write non-fiction. They have all these pieces of information they piece together. Our first job is going to be deciding on what pieces the author has put together. Then we're going to take notes on the section.

Model reading by reading one section at a time and then making notes in the margin on OHT. Also comment on the diagrammatic features page by page.

Discuss which parts of the reading relate to the question and take notes on just those pieces.

Have children copy down notes.

CONCLUSION
Recap on what we have covered and the strategy approach.

Appendix F

Summary of 2004 Professional Development

	Theory	Practice
Term 1	Workshops covering: ▪ The impact of schema theory, cognitive strategies, metacognition and motivation on the reading comprehension strategy approach; ▪ Teaching techniques for successful strategy instruction; ▪ Range of comprehension strategies; ▪ Planning a reading comprehension lesson; ▪ Assessing student reading comprehension needs; ▪ Discussion of professional readings; ▪ Participation in a modelled lesson; ▪ Observation and discussion of videoed lessons.	
Term 2	Two focus group meetings: 1. Discussion of successes and difficulties in strategy implementation; 2. Discussion of successes and difficulties in teaching non-fiction strategies. ▪ Professional development on the teaching of non-fiction strategies.	▪ Teachers observe 8-10 modelled lessons; ▪ Teachers teach 0-2 observed lessons.
Term 3	Two focus group meetings: 1. Discussion of successes and difficulties in teaching non-fiction strategies; 2. General feedback on successes and difficulties with strategy implementation.	▪ Teachers observe 6 modelled lessons on the teaching of non-fiction strategies; ▪ Teachers teach 4 observed lessons on the teaching of non-fiction strategies.
Term 4	One focus group meeting: ▪ Teachers are given assistance with planning for the fourth term; ▪ Teachers make an individual assessment of progress; ▪ Teachers critique course materials and content.	

Appendix G

LESSON PLANNING FORM FOR READING COMPREHENSION STRATEGY LESSONS

1. Reading must make sense

2. Direct instruction of strategy **Activating Prior Knowledge**

What are we learning?

This means thinking about what you know about what you know about the topic of the text.

What you already know about the world can help you understand what you read.

As you read you should continually try to make connections between what you know and the new ideas in the text.

Why is this strategy important?

It helps you prepare for reading.

It helps you to focus your attention while reading.

When can you use the strategy?

If done...

BEFORE your read it will help you anticipate what the text will be about which will help you set purposes for reading and make predictions.

WHILE I will help you update and revise your predictions and it will help you set new purposes.

AFTER reading it will help you evaluate and monitor how well you understand the text.

How do you do the strategy?

REFER TO THE POSTER- Be a reading detective and activate your prior knowledge.

1. Look at the title, pictures, headings, chapter titles in the text to gain an idea of what it is about.
2. Think about what you already know about the topic.
3. Sometimes it helps to write down what you already know about the topic.
4. As you read, try to make connections between what you know about the topic and the new ideas in the text.

Personal example

Travel reading - location of the Blue mountains and how close Bathurst is where they have car races. I thought it was a long way from Sydney.

Have the Lonely Planet NSW book to show.

Teacher models how to do the strategy

Could use blocks here. Want to move away from heavy scaffolding but still model strategy if needed in the group - 1st page, 2nd page- use of the stop/go cards. Reinforce combining strategies-Comprehension monitoring-Activating prior knowledge.

3. Vocabulary

SEVERE- Very harsh, with great force
COMMEMORATE- remember some event that happened in the past
LAGOON- salt water lake that is split from the sea by a sand bank.

4. Guided practice of strategy

SURVEY THE TEXT AND PREDICT WHAT WE THINK IT WILL BE ABOUT

Ask the students to survey the article. Check to see if they use the first part of the strategy themselves - praise strategy use - ask the students to discuss the text with their partner.

THINK ABOUT WHAT THEY ALREADY KNOW ABOUT THE TOPIC AND THE NEW IDEAS IN THE TEXT

Use a KWL chart - students write their current knowledge in the K section and any focus questions they may have in the W part of the chart.

Combine strategies with the use of the STOP/GO cards- activate and reflect on prior knowledge.

Encourage after pages 4/5 - students to work in pairs and continue.

5. Review of strategy

Recap on what we have covered and the strategy approach.

Students look back at the K W L chart and fill in L section and review the K section to confirm or modify prior knowledge.

Appendix H

LESSON PLANNING FORM FOR READING COMPREHENSION STRATEGY LESSONS

Materials

- Set of readings – Fossil Hunting Heather Hammonds
  - Fascinating Fossils Chris Pellant
- Copy on OHT
- OHP
- OHT pens
- Reading non fiction poster
- Copy of words/definitions on cards

1. Reading must make sense

Refer to the banner 'reading must make sense'. This is very important. As readers it is your job to demand meaning from text.

2. Direct instruction of strategy

What are we learning?

How to read Non-fiction and take notes.

Why is this strategy important?

Non-Fiction text is different than fiction. We need a strategy to help us focus on, understand and remember the most important information.

When can you use the strategy?

When ever we read non-fiction.

Where have you used this strategy before?

How do you do the strategy?

REFER TO THE POSTER-Reading Non-fiction text. EPR with a partner.

1. Survey the text for the topic and organisation
2. Activate your background knowledge and make a prediction
3. Choose or have in mind a big idea or question to research
4. Read the section and take notes that relate to your purpose question.

Personal example

Talk about how I took notes on the Duffy reading 'Imaging' to help me understand and remember the important information.

Teacher models how to do the strategy

Show the students the jigsaw and talk about how it is similar to what authors do when they write non-fiction. They have all these pieces of information they piece together. Our first job is going to be deciding on what the author has put together. Then we are going to take notes on the text that answer our question.

5. Guided practice of strategy

Vocabulary introduction

Fossils-*parts of animals and plants from long ago.*

SURVEY THE TEXT FOR TOPIC AND ORGANISATION

Let's have a look at this text and think about how we might survey it.

Show the students the text and have a good look at the front cover and title.

Read the words on the back cover.

Show the contents page.

Let's look at the text pages and survey them. Muse aloud about the organisation of the pages.

-Each page has its own heading which tells us what the page is going to be about.

-There are diagrams on each page which tells us what the page is going to be about. These will help us to understand the text.

ACTIVATING BACKGROUND KNOWLEDGE AND MAKE A PREDICTION

Ask the students what they think the text is about and to write down what they know about how fossils are formed?

CHOOSE OR HAVE IN MIND A BIG IDEA OR QUESTION TO RESEARCH

Tell the students that we are going to look at the question:
"How is a fossil formed?"

READ THE SECTION AND TAKE NOTES THAT RELATE TO YOUR PURPOSE QUESTION

Ask the students what they can do to understand the text:

Refer to Diagrams
Draw pictures
Read captions
Think about their background knowledge.

Start by reading; How do fossils form? and take notes in the margin.
Muse aloud and comment on the diagrammatic features.

Discuss which parts of the reading relate to the question, highlight and take notes on just those pieces.

Have students copy down notes.
Students can work with a partner and apply the above strategy using the text Fascinating Fossils. Highlight and make notes to find information to answer the question How is a fossil formed?

5. Review of strategy

Recap on what we have covered and the strategy approach.

Appendix I

Lesson Planning Form for Reading Comprehension Strategy Lesson - Inferring

Materials

- Mystery object
- McEwan chart of words (p. 93)
- Copy of the 'Inferring' strategies on laminated cards:
    1. Know what the author has written
    2. Understand what the author wants us to know, but has not written
    3. Use our background knowledge
    4. Decide what the hidden or deeper meaning is

- Whiteboard
- Whiteboard pens
- Blutak
- Vivids
- Paper strips
- Pens
- McEwan p38 notes about infering

Introduction

Talk about what a strategy is and how it can help our reading.
What do I mean by a strategy?
Where do these strategies that you use happen?

1. Reading must make sense

Point to the banner 'reading must make sense'. Explain that this is very important. As readers it is their job to demand meaning from text.

Why is it important as readers to make sure everything you read makes sense to you?

How will you know it makes sense?

What can you do when it doesn't make sense?

2. Direct instruction of strategy

What strategy are we learning?

How to infer.

Why is this strategy important?

We need to understand what the author is implying but does not state explicitly.

When can we use this strategy?

When ever we read fiction.
What do we mean when we say that we are reading fiction?

How do we do the strategy?

We need to:

1. Know what the author has written
2. Understand what the author wants us to know, but has not written
3. Use your background knowledge
4. Decide what the hidden or deeper meaning is

Personal example

When I read fiction I always need to make sure I understand what I am reading and that I know what the author is saying. Sometimes an author does not write down all the important ideas and meanings in words. So as I read I need figure them out using the clues the author has given me, just like a detective solves a mystery. This reading strategy is called inferring. Inferring happens when I put together the words with what the author means, (but does not always write down and put into words) along with my background knowledge and decide what the authors' hidden message is.

Use the example from the novel we are reading in class by CS Lewis - *The Lion, the Witch, and the Wardrobe*. The author C S Lewis wants us to know how big and rambling the professors' house is. Read the passage on p.10

I had to infer that the professors' house must be really large if it takes 10 minutes to get from the bedrooms to the dinning room, because at my house it would take me less than half a minute! The author also mentioned the stairs so I am assuming that the house must be two

It's about 10 minutes walk from here down to that dining room and any amount of stairs and passages in between.

storied and that the bedrooms were upstairs because you had to go down stairs to get to the dining room.

4. Guided Practice Of Strategy

Show the students a mystery object and ask them to write on strips of paper what it might be and why they think that. Come back to the mat and share orally what they wrote.

Introduce the new reading strategy - INFERRING and tell students that they have just practiced the new strategy.

Share the new INFERRING poster and get the students to read the poster. Make links to the mystery object and how important it is to use your background knowledge to try and work out what it was.

Use the personal example above to model and show the students how to do this strategy. Reinforce the Inferring strategy steps on the poster.

1. ***Know what the author has written***

   Read the text to the students and display on the whiteboard. I'm going to infer out loud for you so you can 'see' or 'hear' what's going on inside my head while I'm reading. Inferring is a kind of thinking that readers do, so when I say "I infer" it means "I think" about something; I have come to a conclusion or made a judgement.

2. ***Understand what the author wants us to know, but has not written***

   Talk to students about how an author does not always write down everything they want us to know and that when we read fiction we have to make sure we understand what the author wants us to know. There are many ways that I can infer, I can say 'I believe" or "I think" or "I deduce." What I mean when I use these words is that I have added up what I have read, with what the author means but has not put into words and I use my background knowledge, I have made an inference. Muse out loud.

3. ***Use your background knowledge***

   Muse out loud.

   Ask the students if everyone's background knowledge is the same. How will this effect what we think the author's hidden message is?

Appendix J

Reading Comprehension : Imaging

Materials

- 'Reading must make sense' banner
- Copy- An explanation of Poetry to my Father G Colquhoun
- Copy- The Best Camping Place in the World- Tadpole SJ Pt 1,No 2 05.
- Examples of describing words
- Five senses drawn
- Highlighter and black pen
- Laminated cards of the steps in imaging:
  - Work out which words are describing words
  - Use prior knowledge about what those words mean
  - Use my senses to create a picture in my mind about the describing words

Introduction

Ask the students what a strategy is? Explain that it is planned thinking to get a job done. When we are reading, this refers to the things we need to do in our heads to help us understand what we read. How do reading strategies help you when you read? What reading strategies have you used this week? How have these helped you understand better what you have read? Who has used the imaging strategy? Encourage students to share examples and say how it helped in their reading comprehension.

Reading must make sense

Show the banner 'reading must make sense'. Why is this very important? As readers it is your job to demand meaning from text.

Direct Instruction of strategy

What strategy are we learning?

IMAGING. This is like making a movie with pictures inside your mind as you are reading.

Why is the strategy important?

It helps you understand and remember what you've read and to sequence the ideas in the story. It also helps your writing by making it more organised and descriptive. It also makes you focus and listen better.

When can we use this strategy?

Particularly when reading fiction. Stress poems, short stories, not just novels-chapter books.

How do we do this strategy?

1. Work out which words are describing words
2. Use your prior knowledge about what those words mean
3. Use my senses to create a picture in my mind about the describing words.

Personal example

I like to read poetry. Show the poetry book and explain about the poet and his reason for writing the poem I am sharing today. Read the poem: *A set of instructions to be used when reading a poem,* and encourage students to point to the part of the body (eg ears-hearing) /senses when the describing words trigger an image to them. I need to locate the describing words and use my background knowledge and 5 senses to make pictures (images) in my head to help me remember what I have read and sequence ideas in the story.

nice example

Guided practice of strategy

Let's practise this strategy.

STUDENT NEED. I want to make sure that each student is aware that more than one sense can be triggered by a word- I *paddled* in the shallow water. Touch, sight, sound, hearing.

The crocodile had sharp, white teeth. Touch, sight, sound (teeth gnashing), taste.

This is like inferring- you can image more than one sense at a time as you make pictures in your head, as you read the authors describing words.

Text introduction

Introduce the text The best camping place in the world to the children and ask how many have been camping and what was the best camping place for them and what made it so.. Ask them to volunteer information about some of the things that may happen in the story.

Ask the children to read the story and highlight the describing words and draw the sense/s that the describing word triggers. Draw a quick sketch of the sense/s beside or near the describing word.

Mental modelling

Refer to above modelling re: more than one sense triggered and sharing of the poem.

In groups share imaging and talk/listen to each other explain what describing words triggered their senses and what images they had in their mind. How do these images help them comprehend (understand) what they are reading?

Reinforce oral/speaking and writing links. How does this imaging strategy help you when you are writing or speaking?

Conclusion

Recap on what we have covered and the strategy approach.

Appendix K

Inferring

What strategy are we learning?
How to infer.

Why is the strategy important?
We need to understand what the author is implying but does not state explicitly.

When can we use this strategy?
Whenever we read fiction.

How do we do the strategy?
We need to:

1. Know what the author has written
2. Understand what the author wants us to know, but has not written
3. Use our background knowledge
4. Decide what the hidden or deeper meaning is

Scaffolding level	**Teaching strategy**	**Activity**	**Suggested text**
1. Much teacher support	▪ Start with a practical example (remember the apple corer?) o Use McEwan[1] chart (p. 93) and get children to use those words when describing your object. ▪ Teacher modelling o Use a variety of stories to model inferring	▪	▪ Fairytale News ▪ Encyclopaedia Brown
2. Moderate teacher support	▪ Choose a paragraph of text. Work whole class and talk through the steps through directed teacher questioning (Duffy p. 106)	▪	▪ Different paragraphs. (Eric, Assessment Bank)
3. Occasional teacher support	▪ Students work in pairs with McEwan progression of steps (p. 83). Work orally.	▪ Use chunks of text with inferential questions.	▪
4. Minimal teacher support	▪ Model whole-class QAR (Question, Answer Response).[2] Then work in groups deciding how to categorise questions on a given passage (3 recall, 1 inferential).	▪	▪
5. No teacher support	▪ Children work on question answering individually.	▪	▪

[1] McEwan, E. (2004). *7 strategies of highly effective readers.* Thousand Oaks: Corwin Press.
[2] Raphael, T. E., & Wonnacott, C. A. (1985). Heightening fourth-grade students' sensitivity to sources of information for answering comprehension questions. *Reading Research Quarterly, 20*(3), 282-296.

Appendix L

Index of Reading Awareness

Evaluation

1. What is the hardest part about reading for you?
    a. Sounding out the hard words.
    b. When you don't understand the story
    c. Nothing is hard about reading for you.
2. What would help you become a better reader?
    a. If more people would help you when you read.
    b. Reading easier books with shorter words.
    c. Checking to make sure you understand what you read.
3. What is special about the first sentence or two in a story?
    a. They always begin with "Once upon a time..."
    b. The first sentences are the most interesting.
    c. They often tell what the story is about.
4. How are the last sentences of a story special?
    a. They are the exciting, action sentences.
    b. They tell you what happened.
    c. They are harder to read.
5. How can you tell which sentences are the most important ones in a story?
    a. They're the ones that tell the most about the characters and what happens.
    b. They're the most interesting ones.
    c. All of them are important.

Planning

1. If you could only read some of the sentences in the story because you were in a hurry, which ones would you read?
    a. Read the sentences in the middle of the story.
    b. Read the sentences that tell you the most about the story.
    c. Read the interesting, exciting sentences.
2. When you tell other people about what you read, what do you tell them?
    a. What happened in the story.
    b. The number of pages in the book.
    c. Who the characters are.
3. If the teacher told you to read a story to remember the general meaning, what would you do?
    a. Skim through the story to find the main parts.
    b. Read all of the story and try to remember everything.
    c. Read the story and remember all of the words.
4. Before you start to read, what kind of plans do you make to help you read better?
    a. You don't make any plans. You just start reading.
    b. You choose a comfortable place.
    c. You think about why you are reading.
5. If you had to read very fast and could only read some words, which ones would you try to read?
    a. Read the new vocabulary words because they are important.
    b. Read the words that you could pronounce.

c. Read the words that tell the most about the story.

Regulation

1. What things do you read faster than others?
    a. Books that are easy to read.
    b. When you've read the story before.
    c. Books that have a lot of pictures.
2. Why do you go back and read things over again?
    a. Because it is good practice.
    b. Because you didn't understand it.
    c. Because you forgot some words.
3. What do you do if you come to a word and you don't know what it means?
    a. Use the words around it to figure it out.
    b. Ask someone else.
    c. Go on to the next word.
4. What do you do if you don't know what a whole sentence means?
    a. Read it again.
    b. Sound out all of the words.
    c. Think about the other sentences in the paragraph.
5. What parts of the story do you skip as you read?
    a. The hard words and parts you don't understand.
    b. The unimportant parts that don't mean anything for the story.
    c. You never skip anything.

Conditional knowledge

1. If you are reading a story for fun, what would you do?
    a. Look at the pictures to get the meaning.
    b. Read the story as fast as you can.
    c. Imagine the story like a movie in your mind.
2. If you are reading for science or social studies, what would you do to remember the information?
    a. Ask yourself questions about the important ideas.
    b. Skip the parts you don't understand.
    c. Concentrate and try hard to remember it.
3. If you are reading for a test, which would help the most?
    a. Read the story as many times as possible.
    b. Talk about it with somebody to make sure you understand it.
    c. Say the sentences over and over.
4. If you are reading a library book to write a book report, which would help you the most?
    a. Sound out words you don't know.
    b. Write it down in your own words.
    c. Skip the parts you don't understand.
5. Which of these is the best way to remember a story?
    a. Say every word over and over.
    b. Think about remembering it.
    c. Write it down in your own words.

Appendix M

Self-efficacy Student Answer Sheet

Score
Reading _____
Numeracy _____
Total _____

Name _____

School _____

Practice Items

P1. How sure are you that you can eat a small ice cream when you go to the pictures?

CAN'T DO IT MAYBE SURE VERY SURE

P2. How sure are you that you can stand on your head for five minutes?

CAN'T DO IT MAYBE SURE VERY SURE

P3. How sure are you that you can say your five times table?

CAN'T DO IT MAYBE SURE VERY SURE

P4. How sure are you that you can skate along the footpath on roller blades?

CAN'T DO IT MAYBE SURE VERY SURE

1. How sure are you that you can use what you already know about disasters to help you understand a book you were reading about tsunamis?

CAN'T DO IT MAYBE SURE VERY SURE

2. How sure are you that you can work out which number comes just after 67?

CAN'T DO IT MAYBE SURE VERY SURE

3. How sure are you that you can write a few sentences about a story you have read that would tell someone else what the book was mainly about?

CAN'T DO IT MAYBE SURE VERY SURE

4. How sure are you that you can work out one main thing that a writer wanted you to think about after you had finished reading her book?

CAN'T DO IT MAYBE SURE VERY SURE

5. How sure are you that you could work out 3 sets of 18 (or 3 x 18) in your head?

CAN'T DO IT MAYBE SURE VERY SURE

6. How sure are you that you can work out what someone in a story is going to do next?

CAN'T DO IT MAYBE SURE VERY SURE

7. How sure are you that you can find the answer to a question your teacher gives you about dogs in a book about dogs?

CAN'T DO IT MAYBE SURE VERY SURE

8. How sure are you that you can use a diagram (drawing) in a book about birds to help you understand how birds fly?

CAN'T DO IT MAYBE SURE VERY SURE

9. How sure are you that you can guess what is going to happen at the end of a fairy tale you are reading and be right?

CAN'T DO IT MAYBE SURE VERY SURE

10. How sure are you that you can work out 47 + 53 in your head?

CAN'T DO IT MAYBE SURE VERY SURE

11. How sure are you that you can make a picture in your mind to go with the story you are reading?

CAN'T DO IT MAYBE SURE VERY SURE

12. How sure are you that you can work out 70 take away 15 (or 70 - 15) in your head?

CAN'T DO IT MAYBE SURE VERY SURE

13. How sure are you that you can work out ¼ of 16 in your head?

CAN'T DO IT MAYBE SURE VERY SURE

14. How sure are you that you could work out how many 10 dollar notes you will need to buy a toy that costs 60 dollars?

CAN'T DO IT MAYBE SURE VERY SURE

15. How sure are you that you can work out which number comes just before 502,000?

CAN'T DO IT MAYBE SURE VERY SURE

16. How sure are you that you could write some notes after you had read a few pages about bears that would tell someone else what the writer's main ideas were?

CAN'T DO IT MAYBE SURE VERY SURE

17. How sure are you that you can use the headings on a page about volcanoes to work out what information was on that page?

CAN'T DO IT MAYBE SURE VERY SURE

18. How sure are you that you can give the right answers to questions your teacher asks you about what you've read?

CAN'T DO IT MAYBE SURE VERY SURE

19. How sure are you that you can share out 16 jelly beans between 4 people so they each receive the same number of jelly beans?

CAN'T DO IT MAYBE SURE VERY SURE

20. How sure are you that you can read all the words in a book your teacher gives you at reading time?

CAN'T DO IT MAYBE SURE VERY SURE

Appendix N

Components of Transactional Strategy Instruction (R. Brown, Pressley, van Meter, & Schuder, 1996, p. 19)

1. Strategy instruction is long-term, with effective strategies instructors offering it in their classroom throughout the school year; the ideal is for high quality process instruction to occur across school years.
2. Teachers explain and model effective comprehension strategies. Typically, a few powerful strategies are emphasised.
3. The teachers coach students to use strategies on an as-needed basis, providing hints to students about potential strategic choices they might make. There are many mini-lessons about when it is appropriate to use particular strategies.
4. Both teachers and students model use of strategies for one another, thinking aloud as they read.
5. Throughout instruction, the usefulness of strategies is emphasised, with students reminded frequently about the comprehension gains that accompany strategy use. Information about when and where various strategies can be applied is commonly discussed. Teachers consistently model flexible use of strategies; students explain to one another how they use strategies to process text.
6. The strategies are used as a vehicle for coordinating dialogue about text. Thus a great deal of discussion of text content occurs as teachers interact with students, reacting to students' use of strategies and prompting additional strategic processing... In particular, when students relate text to their prior knowledge, construct summaries of text meaning, visualise relations covered in a text, and predict what might transpire in a story, they engage in personal interpretation of text, with these personal interpretations varying from child to child and from reading group to reading group.

Appendix O

Nine Points of Progress that Teachers Go Through as They Learn to Teach Strategic Processing (Duffy, 1993b).

1. Confusion and rejection. Teachers protested that they could not create their own programmes without the aid of a textbook.
2. Teacher controls the strategies. Teachers taught the strategy through asking questions, but did not make the strategy explicit to students through mental modelling.
3. Trying out. Teachers gave declarative and procedural, but not conditional, knowledge about the strategy. Strategies were taught serially with no reference to other strategies, or real-world instances of strategy use.
4. Modelling process into content. Teachers became more aware of the need to give students metacognitive control over strategy use. Strategies were related to the text at hand and mental processes were verbally modelled.
5. The wall. Teachers broke away from basal-directed instruction, but resisted embracing the complexity of strategy instruction. Instead they looked for ways to simplify what they were doing and maintain teacher control over instruction.
6. Over the hump. Some teachers moved past 'the wall' and began to see strategies as a means to an end rather than an end in themselves. Teachers at this point used strategies in authentic reading tasks.
7. I don't quite get it yet. Teachers still thought there was only one right way to teach a strategy, and were not ready to experiment depending on the demands of various texts.
8. Creative-inventive. Teachers were no longer baffled by strategies but revised, invented, or skipped strategies as the needs of the children dictated.
9. Unnamed. This was an unobserved point but left room for point 8 teachers who acknowledged that they had not made it yet but still had room to grow.

Appendix P

Pupil Awareness Rating Scale (Duffy et al., 1986, p. 252)

A highly rated response to the question "what" was being taught must include a *specific* reference to the *process* involved in completing the tasks and an example:

0 No awareness (Student does not know, is inaccurate, or supplies a response that does not make sense.)
1 The response is a non-specific reference to the task. ("We are learning about words.")
2 The response refers to the name of the specific task which can be done successfully if the process is applied correctly or is an example of the specific task. ("We are learning *ou* words.")
3 The response includes a specific reference to the process being learned. ("We are learning how to sound out *ou* words.")
4 The response includes a specific reference to the process and an example. ("We are learning how to sound out *ou* words, like in *out*.")

A highly rated response to the question "why" or "when it would be used" must specify both the *context* in which it will be useful and *what* he or she is able to do in the context:

0 No awareness or includes no reference to the specific task. ("I'll get smarter," or "It'll help me when I grow up.")
1 The response is not specific to the task but is related to language (listening, speaking, writing, reading) generally. (I'll write better stories," or "I'll read better.")
2 The response refers to an appropriate general category in reading but not to the specific use for what was taught. ("I can decode words better.")
3 The response includes specific reference to what he or she will be able to do but not the context in which it would be useful. ("I can sound out *ou* words.")

OR

The response specifies the context in which it would be useful but not what he or she will be able to do. ("I can use this when I come upon an unknown word in my book.")

4 The response includes both what he/she will be able to do and the context in which it is useful. ("When I come upon an unknown *ou* word in my library book, I'll be able to sound it out.")

A highly rated response to the question "how do you do it" must include an example of how one does the mental processing associated with successful completion of the task or an appropriate sequence of steps to be followed.

0 No awareness.
1 The response is not specific to the mental processing to be used. ("I'll sound the word out.")

OR

The response is merely an example that does not illustrate conscious understanding of the mental processing to be used. ("Loud.")

2 The response refers to features to attend to but not to the way they are used in doing the mental processing. ("I say, 'l-ou-d.'")
3 The response identifies the features to attend to and some understanding of the *mental processing.* ("If I see a word that has *ou* in it, I say the sound of *ou*.")

4 The response includes a sequence of steps or a specific example of the mental processing. ("When I meet an unknown word such as *loud*, I think first … and then…," etc.)

Appendix Q

Lesson Observation Form – Reading Comprehension Strategy Research

Teacher _____ **Strategy taught**_____

Date _____

Planning

- Teacher has a lesson plan. Yes/No (Attach copy of plan)

Modelling

- Examples of mental modelling of strategy (verbatim accounts)

- Teacher gives personal example of when she has used a strategy to encourage motivation (verbatim account)

Coaching

- Teacher praises student for using a particular strategy (verbatim account)

- Teacher questions students to promote thinking (verbatim accounts categorised as LO, MO, HO i.e. low order, middle order and high order)

Question

MO, HO, LO

- Level of scaffolding used (as described in Benchmark School's 2003 *Staff in-service Folder*)

- Pattern of student/teacher dialogue
    - Predominantly IRE (Inquire, Respond, Evaluate) Yes/no
    - Predominantly dialogue among students with teacher coaching Yes/no

Applying

- Follow-up task chosen

Appendix R

Summary of strategies taught by the treatment group teacher

Year	Term	Strategy Taught
2004	2	▪ Comprehension monitoring ▪ Activating prior knowledge
2004	3	▪ Reading non-fiction
2005	1	▪ Comprehension monitoring
2005	2	▪ Activating prior knowledge ▪ Reading non-fiction
2005	3	▪ Inferring
2005	3	▪ Imagery