Hypothesis: Explicit teaching of onset and rime to Grade 2/3 students improves accuracy and automaticity in individual word reading and prose reading, as well as in writing.

ABSTRACT

Children who struggle to decode at the word level are likely to have difficulties in other levels of reading as a result. It is probable that their writing will also reflect this deficit in knowledge. The hypothesis of this study is that explicit teaching of onset and rime to Grade 2/3 students improves accuracy and automaticity in individual word reading and prose reading, as well as in writing.

In the current study, literacy skills at the word level were developed by introducing onset and rime segmentation and blending in one-syllable words. The strategy of analogy was taught. Reciprocity was encouraged by directing students to apply their knowledge of the known to solve the unknown in both reading and writing. Students were encouraged to reflect upon and articulate their learning as part of the process.

For the intervention group, improvements in accuracy were significant during reading and writing processes. Automaticity improved (except for the writing task) but not significantly when compared with the control group. It should be taken into account that the students were much more conscious of planning, monitoring and reviewing and that this was reflected in their response times.

Other factors were positively affected by the process. The intervention group displayed increased comprehension, metacognition and self-efficacy.

This case study would suggest that it is beneficial to incorporate the teaching of onset and rime blending and segmentation as part of early literacy programs, once students have a good grasp of letter knowledge. Quick accurate recognition and production of letter clusters equips students to read and write many one-syllable words. They can then extend its application to two or three syllable words.

INTRODUCTION

"Although understanding is the goal, children must develop effective and efficient strategies for reading unfamiliar words when they encounter them in text…10 per cent to 15 per cent of children routinely have difficulty in this area" (Allington, 1998; cited in Westwood, 2001, P67). At-risk students may find the writing process to be a slow and tedious task. Reading may be confusing and attention-demanding. As speedy, accurate processing is an important component of reading and writing, students must be provided with the necessary skills at the word level and know how to apply them. Students should learn "how to do something, do it better, do it faster, link it up to something, and prepare it for future independent use." Clay (2001, P31-32). To this end, the current study investigates explicit and systematic teaching of onset and rime units to Grade 2/3 students, monitoring its effect on their accuracy and automaticity during both reading and writing.

"The larger the pronounceable units a child can discover and use, the less learning effort will be required" Clay (1991, P290). By comparing single letter analysis with letter clusters units, Clay found that letter by letter analysis was slower and less efficient. To facilitate letter cluster knowledge in one-syllable words, onset and rime units can be used, where the onset is the initial consonant or consonant cluster preceding the vowel and the rime is the vowel and any consonants after it. Fountas and Pinnell (1999) discussed research carried out by Goswami and Bryant (1990), suggesting that the use of onset and rime enabled a child to read unfamiliar one-syllable words more easily. Snowball and Bolton (1999) referred to research by Moustafa (1995) that indicated students tend to apply their knowledge of onsets and rimes in known words to produce unfamiliar words, rather than their understanding of letter-sound correspondences. Being able to recognise, segment and manipulate onset and rime is vital for students wanting to develop word level skills in literacy (Wood 2000).

Students who struggle to make links at the word level need explicit instruction to make and apply connections between words. Analogy, a 'cut and paste' strategy, is used to solve or write new words. By introducing analogy, teachers provide readers and writers with the empowering skill to teach themselves. But this strategy should not be randomly introduced. Juel and Minden-Cupp (2000) suggested that using analogies to rimes in key words is effective only if the students already have a good knowledge of consonant and

vowel sounds. Snowball and Bolton (1999) indicate that the greater the number of print words that a student knows, the greater their ability to use analogy.

Reciprocity between reading and writing has the potential to strengthen both processes. Clay (2001) noted that students need to realize that what they can read and what they can write is interrelated and can be used in both contexts, thus extending their pool of knowledge. This transfer of knowledge does not occur spontaneously but when teachers explicitly highlight links between the processes, they help students to dig a ditch between their pools of knowledge (DeFord & Fullerton, 2000 in RRCNA).

The visual analysis of words into useful letter clusters during reading is reinforced in writing because 'chunking' aids efficient production. By closely examining what the student does in writing, the teacher gains an insight into the student's sound-symbol relationships (Salinger, 2003) and should be better equipped to provide what is specifically needed to address reading deficits at the word level.

Poor readers who often expend excessive amounts of time decoding at the word level lack automaticity, the ability to carry out a skill without demanding attention or effort. Students need to be able to quickly recognize known things in reading and quickly construct known things in writing, enabling them to spend time working on less familiar words (Clay, 2005). It has been shown that when words are quickly and effortlessly identified, it allows working memory to be freed up, thus allowing for processing at other levels (Munro, 1995). This increases the likelihood of reading fluency and comprehension (Chard & Osborn, 1999). In addition to its detrimental effect on comprehension, slow processing due to inefficient word level skills may also negatively impact on confidence or engagement (Badian 2001). Therefore working towards achieving gains at the word level could have many benefits.

Metacognition is powerful. As explained by Munro (2007), metacognition is like a little voice in your head, directing your attention, governing how you think. The key tasks of metacognition are to plan, monitor and review. Munro (1998) referred to the development of 'meta-orthographic skills', giving students greater understanding and control of their learning. As children discover and use new skills and strategies, they should be encouraged to reflect and talk about them (Clay, 1998). In so doing, they are more likely to use them and then be able to move on to address new challenges.

When a student starts to use orthographic patterns to recognise words quickly, the teacher should move from teaching phonics to spend more time reading and writing text (Stahl, 1998, cited in Westwood, 2001). Current research seems to indicate that onset and rime will assist students in developing orthographic knowledge which can be applied to both reading and writing and the current study investigates this with Grade 2 and Grade 3 Victorian students, monitoring accuracy, automaticity and reciprocity.

Hypothesis: Explicit teaching of onset and rime to Grade 2/3 students improves accuracy and automaticity in individual word reading and prose reading, as well as in writing.

METHOD

Design

This case study used the OXO design. Grade 2/3 students experiencing minor literacy difficulties were explicitly instructed on how to apply knowledge of onset and rime units in one-syllable words. Accuracy and automaticity changes were monitored in both reading and writing processes.

Participants

The intervention and control groups comprised four Grade 2/3 students of both sexes. Two students had accessed Reading Recovery. Three were new enrolments. Pre-testing ages varied from 7 years 9 months to 9 years 8 months. After discussing results with the Principal, Literacy Coordinator and classroom teacher, the selection was made. These students were identified as potentially being able to benefit from additional assistance in one or more elements of reading and/or writing. They were in the process of consolidating phonological knowledge, developing rapid automatised naming and developing orthographic learning through the processes of phonemic recoding and analogy. Neale assessment results indicated that generally the students were Stanine 6 or below, based on their years of schooling (YOS). As the study took place early in the school year, pre and post- test Neale results were based on YOS that applied at the end of the previous year, as suggested in the assessment manual.

Materials

Munro's Rapid Automatised Naming (RAN) test;

Westwood's oral Onset and Rime test;

Dalheim's Rime Unit test;

Neale Analysis of Reading Ability;

Running Record, using CLaSS leveled texts: AlphaAssess;

Teacher designed onset and rime writing assessment;

ERIK self-efficacy scales (intervention group only), adapted from those designed by James W Chapman & William E Tunmer, Massey University New Zealand, 2002.

Commercial resources:

Smart Kids (NZ) Limited – Making and Breaking (Early Level and Fluent Level)

Smart Kids (NZ) Limited – Chunks

Coko - Systems – Learning Bricks – Consonant Blends and Digraphs

Other resources

Exercise books; Lists of commonly used onsets and rimes; Individual onset spinner and laminated rime cards; Flip books; Magnetic letters; Whiteboards; Different writing implements for writing or highlighting; Power point for Rapid Automatised Naming.

Procedure

Timed pre and post assessments included: Munro's RAN testing; Westwood's oral onset/rime test (assessed ability to divide words into onset and rime); Dalheim's Rime Unit test (assessed reading 149 monosyllabic words containing 37 dependable rime units); Neale Analysis of Reading Ability (accuracy, comprehension and rate); a running record analysis; and a teacher generated writing test (assessed words containing common onsets including blends and digraphs, as well as rime units contained in the Rime Unit test). The intervention group completed self-efficacy scales (ERIK) although self-efficacy was not being specifically investigated. As half the children were in early Grade 2, Munro's Orthographic test was not carried out.

Students were withdrawn from the classroom for ten sessions of forty minutes, usually during the first learning block of each day. Timetabling constraints resulted in two separate sessions being conducted on one day. The program was completed within eleven consecutive school days.

The teaching procedure was designed to consolidate and extend knowledge of onset and rime units to assist with reading and writing monosyllabic words, leading to its application during prose reading. Some elements suggested by Munro (2007) and Collins et al (1989) were integrated.

The aim of the project was explained to the students. "You already know a lot about reading and writing. I want to show you some helpful hints/tricks so that you can teach yourself even more about reading and writing." This affirmed the children and confirmed that they have ownership of their learning.

Apart from the initial session, each session began with a review of the work of the previous day. Orientation to the new rime units was provided. Oral work was an essential part of each session. Analogy was introduced as a strategy. "If this word is 'in', what might this word ('fin') be? Rhyming words were brainstormed (child orally provided meaning or used word in sentence) and recorded, with the teacher as scribe. Students had access to onset wheels and rime cards to prompt word generation. Words that rhymed but were spelt with a different rime unit were discussed and recorded separately, showing that not all spelling is regular. Onset and rime segmentation and blending were modeled by the teacher, finger tapping the onset and rime as the word was orally segmented before using magnetic letters. Initial coaching was followed by group work and then independent work. Students wrote words containing the rime unit, composed and wrote a few sentences which they read to the group. At the beginning of the next session, as part of the review process, each child read another child's story.

The reduction in scaffolding and order of introduction were systematic and gradual, providing support to facilitate consolidation and confidence. Onset units progressed from single consonant to consonant blends and then to digraphs. Two letter rime units were introduced, followed by three letter rime units. Onset and rime instruction was explicitly applied to both reading and writing procedures. Reciprocity between the processes was stressed. Games were used to reinforce learning. Each session highlighted elements of metacognition. Positive self-scripts were modeled. Students reflected on their learning. For example:

I can 'make and break' (blend and segment).

I can identity the 'trigger word' and have a picture of it in my 'mind's eye'.

I can use this new knowledge whenever I read or write.

Children consolidated their new understandings using several modes of learning – looking, hearing, saying, manipulating, and using different colours/pens. Speedy retrieval of sounds in words was stressed. The students related to the explanation that if you are too slow, by the time to get to the end, you will forget the start. Constructive and timely feedback was provided. Students were encouraged to take risks in their learning. On two occasions, the students took their workbooks and materials home to explain their strategies to their parents and celebrate their new skills.

In this research, the independent variable was practice with onset and rime. The dependent variables were improved accuracy and automaticity in reading and writing.

After the teaching program, post-testing took place. Data was collated and analyzed. Comparisons were made between the two groups. Individual student results were examined and discussed. Trends were noted and related to the hypothesis at both the group and individual level.

RESULTS: Full results in Appendix 2

Table 1: Age in years and months at pre-testing. (Post-testing was 6 weeks later.)

Intervention Group	#1 8yrs 7mths	#2 8yrs 0mths	#3 7yrs 11mths	#4 7yrs 9mths
Control Group	#5 9yrs 8mths	#6 9yrs 7mths	#7 8yrs 9mths	#8 8 yrs0mths

RAPID AUTOMATISED NAMING (Munro)

Table 2: Rapid Automatised Naming (RAN)

	Pre-test time	Post-test time
Average for Intervention Group	38.2	35.2
Average for Control Group	35.7	32.7

There are no norms for 8-9 year olds. Average times for both groups improved. The response time for the intervention group showed a percentage decrease of 7.8%. The control group showed a percentage decrease of 8.4%, reflecting little difference between the groups' average improvement.

ORAL ONSET AND RIME SEGMENTATION (Westwood)

Table 3: Onset and rime segmentation

	SCORE		TIME	
	Pre-test	Post-test	Pre-test	Post-test
Average for Intervention Group	12.00	15.00	45.00	32.50

Average for Control Group	**12.25**	**12.75**	**56.00**	**38.25**
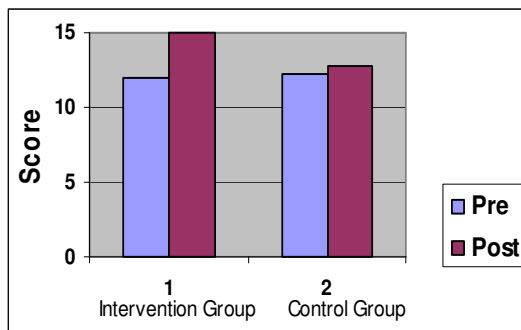
Figure 1: Onset and Rime Segmentation Average Group Score out of 15
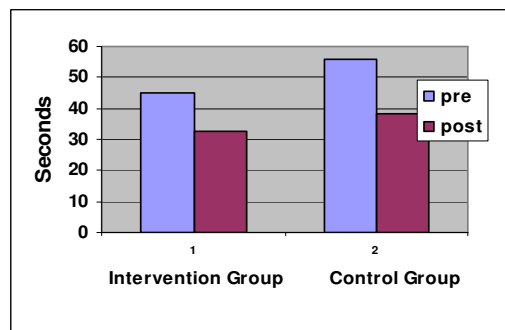
Figure 2: Onset and Rime Segmentation Average Group Time in Seconds

This oral test indicated the uptake of onset/rime knowledge. The intervention group showed a 25% improvement. They showed more benefit from the intervention as the control group had only a 4.1% improvement.

Timed results were used to give some indication of change in automaticity. The intervention group's average showed a decrease in time of 27.8% but the control group had an even greater decrease in time of 31.7%.

READING: RIME UNIT TEST (Dalheim)

Table 4: Reading – Rime Units

	SCORE		TIME		DOUBLE ERRORS	
	Pre	**Post**	**Pre**	**Post**	**Pre Total**	**Post Total**
Intervention Group	118.00	128.50	319.25	287.75	19	1
Control Group	117.25	124.25	331.50	288.75	16	11
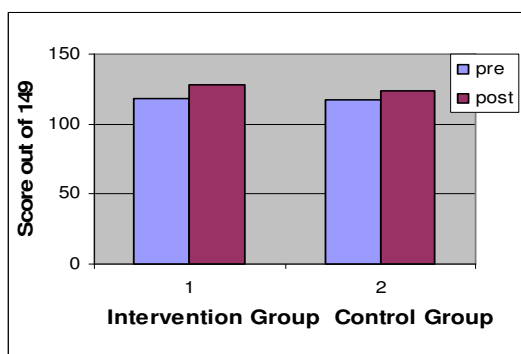
Figure 3: Reading - Rime Unit Average Group Score out of 149
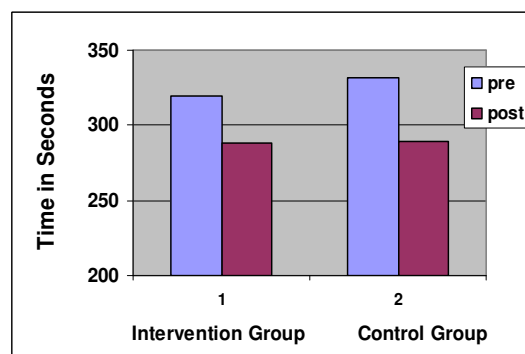
Figure 4: Reading – Rime Unit Average Group Time in Seconds

7

Accuracy results (Table 4) for the Rime Unit Test show the intervention group improved slightly more than the control group, an increase of 8.9% compared with 6.2%, giving some support to the hypothesis in relation to accuracy in reading at the word level.

A 'double error' (where students gave both the incorrect onset and rime) would indicate that little emphasis was placed on accurately accessing all the visual patterns in a word. When looking at 'double errors' (Table 4 - see Appendix 2 for more detail), it should be noted that the intervention group's total pre-test was 19 and post-test was only 1 – a huge improvement. The control group's total decreased from 16 to 11 'double errors'.

Timed results (Table 4) show that the instructional group had a decrease in time of 9.9%. The control group improved to a greater extent, with a decrease in time of 12.9%. Fewer hesitations and more self-corrections were apparent for the intervention group in the post-test. They responded more confidently and were intent on "getting it right". Rather than guessing randomly, they reviewed and sometimes tried again or self-corrected. Although the timed results do not support the hypothesis with respect to automaticity in reading at the word level, these results should be considered within the context of time effectiveness.

NEALE READING ANALYSIS (Neale)
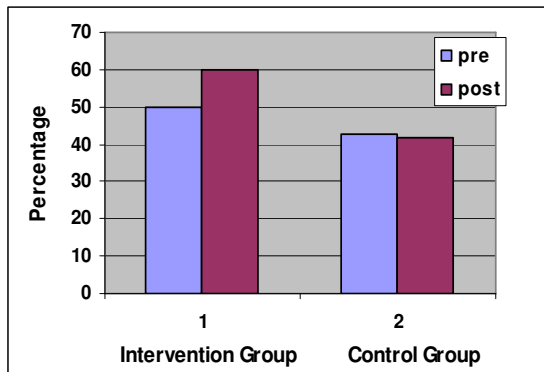
Figure 5: Neale Reading Analysis Average Group Accuracy % Score
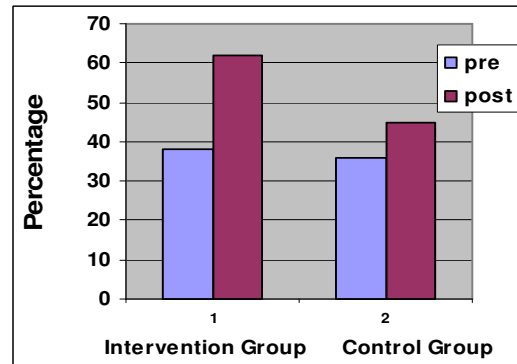
Figure 6: Neale Reading Analysis Average Group Comprehension % Score

Table 5: Neale Reading Analysis

	Acc %		Comp%		Rate%	
	Pre	Post	Pre	Post	Pre	Post
Intervention Group	49.60	60.00	38.00	61.75	59.50	66.75
Control Group	42.50	41.50	35.75	44.75	42.25	51.75

Accuracy results for the intervention group (Fig. 5) showed a 21% improvement in prose reading accuracy whereas the control group result showed a decrease in accuracy of 2.4%. These results support the hypothesis in relation to improved accuracy of reading at the prose level.

Although comprehension was not a direct focus for this study, Figure 6 shows that the intervention positively impacted on this aspect of reading. The intervention group showed an improvement of 62.5%. The control group showed 25.2% improvement.
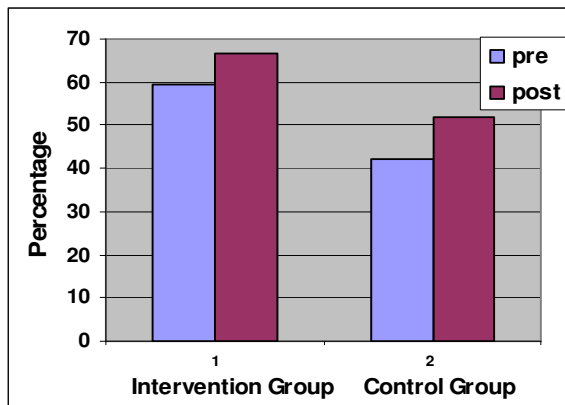
The rate component of the testing showed the intervention group with a 12.2% increase. The control group showed a 22.5% increase. This does not support the hypothesis regarding increased automaticity in prose reading.

**Figure 7: Neale Reading Analysis
Average Group Rate Percentage Score**

RUNNING RECORD

Table 6: Running Record

	Pre-test	**Post-test**
Average for Intervention Group	25.00	26.50
Average for Control Group	25.75	26.25

The intervention group showed a 6% improvement and the control group showed a 1.9% improvement, thus adding support to the prediction of improved accuracy in reading at the prose level.

WRITING TEST: Teacher generated
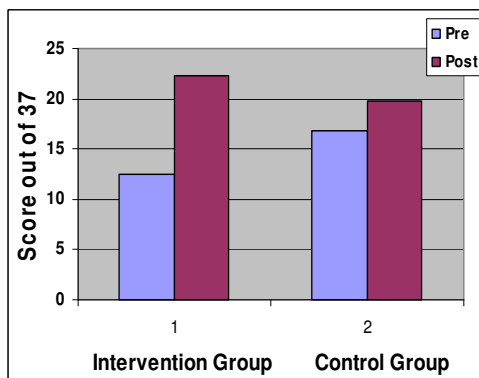
**Figure 8: Writing Test
Average Group Score out of 37**
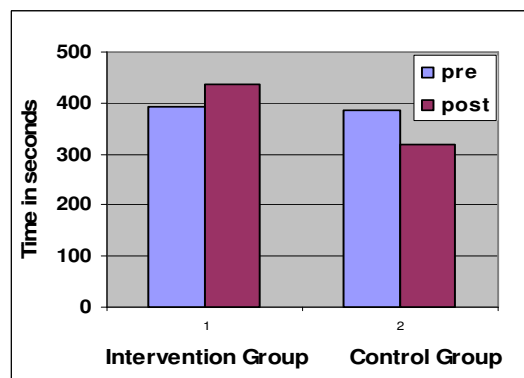
**Figure 9: Writing Test
Average Group Time in seconds**

Table 7: Writing Test

	SCORE		TIME		DOUBLE ERRORS	
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**
Intervention Group	12.50	22.25	391.75	434.75	26	6
Control Group	16.75	19.75	386.25	317.75	20	19

On the writing test, the intervention group showed a 78% improvement in accuracy, whereas the control group only made a 17.9% improvement. These results add support to the writing accuracy component of the hypothesis.

When considering the 'double error' effect, it was again apparent that the intervention group made huge gains. Their score decreased from 26 to only 6, whereas the control group hardly changed, going from 20 to 19.

Automaticity, on the other hand, did not improve for the intervention group. Their time increased by 11%. This may be explained by their time spent slowly articulating as they wrote, checking and making changes. This was not apparent in the pre-test. The control group improved their time by 17.7%.   Hence these times did not show a greater increase in automaticity for the intervention group compared with the control group.

INDIVIDUAL STUDENT TRENDS

Intervention Group – Students #1-4   **Control Group – Students #5-8**

RAPID AUTOMATISED NAMING (Munro)
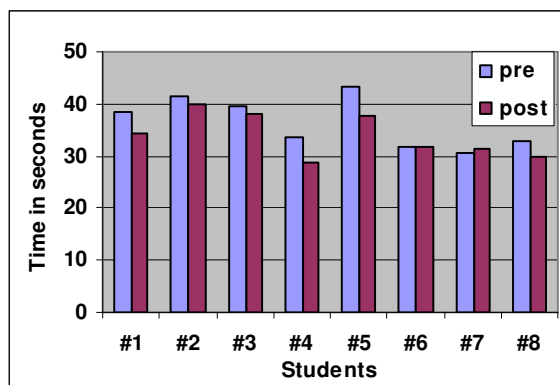
Figure 10: Rapid Automatised Naming Individual Students - Time in seconds
ONSET AND RIME SEGMENTATION (W

In RAN testing, all intervention students improved their response time. Some students who took about 40 seconds may benefit from RAN training. Appendix 2 shows large differences between RANL 1 results for Child #1 and Child #4 compared with their other RANL results. The same applies for Child #5 and Child #8 in both their RANL 1 and RAND 1 results. The process was explained but they may have felt uncertain until the completion of sub-test 1. In other sub-tests, they achieved relatively similar results.
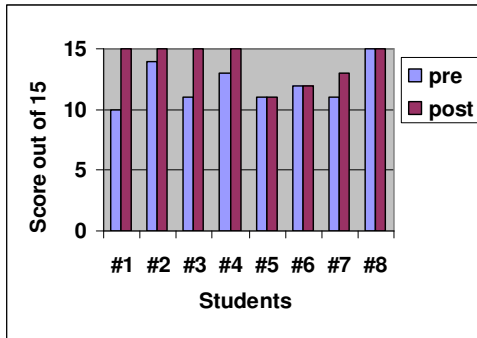
Figure 11: Onset and Rime Segmentation Individual Students: Score out of 15
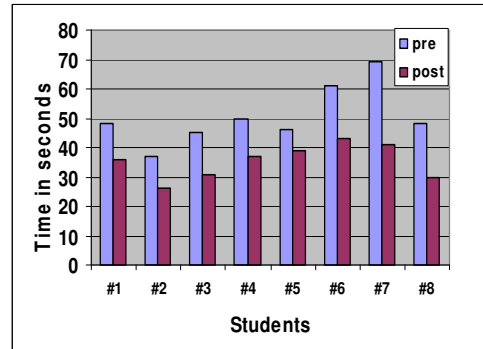
Figure 12: Onset and Rime Segmentation Individual Students: Time in seconds

Accuracy scores for students in the intervention group improved greatly, with all achieving 100% in the post-test, indicating that they benefited from the intervention. They responded deliberately with some re-tries. Each of the students in the intervention group improved their response time, but this was more apparent in the control students #6, 7 and 8.

READING: RIME UNIT TEST (Dalheim)

Analysis Summary   sc=self-correct   o=hesitation (correct but not automatic)
xo=incorrect onset   xr =incorrect rime   x=incorrect onset and incorrect rime

Table 8: Reading – Rime Unit Test Summary: Individual Students #1-4 (Intervention Group)

	#1	Post	#2	Post	#3	Post	#4	Post
Time	235sec	220sec	372 sec	333 sec	468sec	429 sec	202sec	169sec
Auto+corr	122	127	82	101	57	75	126	134
Correct Including	134 (9sc, 3o)	139 (12sc)	109 (9sc18o)	127 (11sc15o)	95 (2sc36o)	106 (3sc28o)	134 (6sc 3o)	142 (7sc 1o)
Errors	15x	10x	40x	22x	54x	43x	15x	7x
Types of errors	2xo12xr 1x	1xo 9xr 0x	7xo 24xr 9x	3xo19xr 0x	2xo 44xr 8x	0xo 42xr 1x	1xo13xr 1x	3xo 4xr 0x

Table 9: Reading – Rime Unit Test Summary: Individual Students # 5-8 (Control Group)

	#5	Post	#6	Post	#7	Post	#8	Post
Time	450secs	405secs	174secs	167secs	436secs	368secs	266secs	215secs
Auto+corr	76	77	134	141	97	109	111	122
Correct Including	89 3sc 10o	95 5sc 13o	135 1sc 0o	144 2sc 1o	122 6sc 19o	124 3sc 12o	123 2sc 10o	134 4sc 8o
Errors	60	54	14	5	27	25	26	14
Types of errors	5xo47xr 8x	2xo 45xr 7x	6xo 8xr 0x	2xo 3xr 0x	1xo 22xr 4x	4xo 17xr 4x	3xo 19xr 4x	2xo 12xr 0x

The intervention group showed great progress with "automatic and correct" responses particularly for students #2 and #3. Less hesitation on the post-test, especially

Child #3, may indicate more confidence in themselves and their knowledge. A general increase in the numbers of self-corrections may indicate they were checking their initial responses and noting inconsistencies with the printed word. There were less "double errors" (incorrect onset and rime) apparent for each member of the intervention group, notably students #2 and #3.
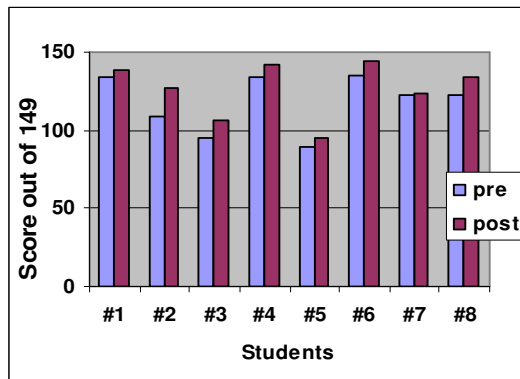
Figure 13: Reading - Rime Unit Test Individual Students – Score out of 149
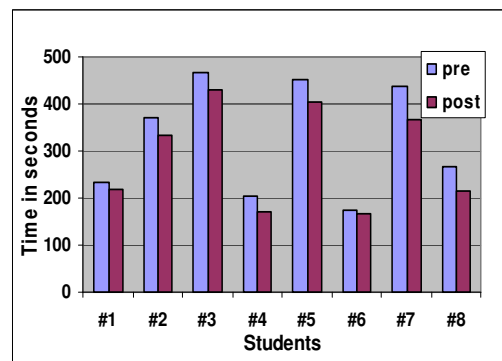
Figure 14: Reading - Rime Unit Test Individual Students – Time in seconds

NEALE ANALYSIS OF READING (Neale)

Table 10: Neale Analysis of Reading
Summary: Individual Students #1-4 (Intervention Group)

	#1 (YOS3)	Post	#2 (YOS2)	Post	#3 (YOS2)	Post	#4 (YOS2)	Post
Pre-test Age	8.7		8. 0		7.11		7. 9	
Neale acc %	34%	59%	50%	48%	41%	56%	74%	77%
stanine	4	6	5	5	5	5	6	6
read age	7.9	8.6	7.2	7.0	6.10	7.3	8.2	8.2
Neale com %	42%	55%	46%	47%	24%	60%	40%	85%
stanine	5	5	5	5	4	6	5	7
read age	7.7	8.3	7.1	7.2	6.3	7.5	6.11	8.3
Neale rate %	47%	43%	64%	79%	38%	53%	89%	92%
stanine	5	5	6	7	4	5	7	8
read age	8.2	8.0	7.10	8.2	6.8	7.4	9.10	9.11

Table 11: Neale Analysis of Reading
Summary: Individual Students #5-8 (Control Group)

	#5 (YOS3)	Post	#6 (YOS3)	Post	#7 (YOS3)	Post	#8 (YOS2)	Post
Pre-test Age	9.8		9.7		8.9		8.0	
Acc %	21%	23%	52%	44%	34%	29%	63%	70%
stanine	3	4	5	5	4	4	6	6
read age	7.1	7.1	8.2	8.0	7.9	7.5	7.8	7.10
Comp %	22%	17%	15%	28%	42%	60%	64%	74%
stanine	3	3	3	4	5	5	6	6
read age	7.1	7.0	6.9	7.5	7.7	8.5	7.7	7.9
Rate %	35%	33%	52%	66%	22%	37%	60%	71%
stanine	4	4	5	6	3	4	6	6
read age	7.4	7.4	8.5	9.2	6.11	7.7	7.7	7.10

Figure 15: Neale Reading Analysis Individual Students % Score Accuracy
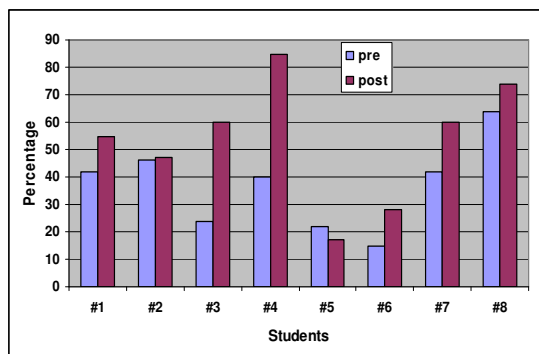
Figure 16: Neale Reading Analysis Individual Students % Score Comprehension
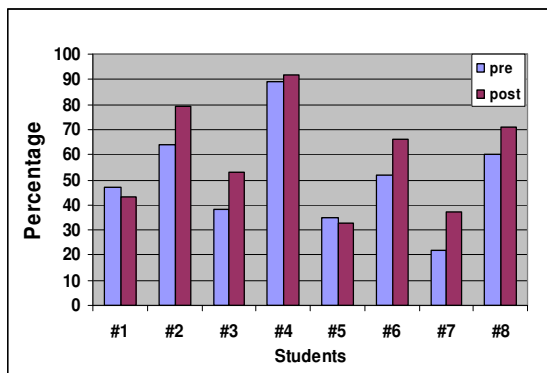
Figure 17: Neale Reading Analysis – Rate Individual Students – Percentage Score

RUNNING RECORD – TEXT LEVEL

Child #1's accuracy improved but the rate was slower. Focusing on the whole word, accessing all visual information, took more time. Child #2 improved rate but lost accuracy slightly. #3 and #4 improved both accuracy and rate. All intervention students showed improvement in comprehension, notably students #3 and #4. For Child #4, this brought accuracy and comprehension into balance, with rate already being very good.

Child #3 responded well to the teaching and improved from L21-24. Child #5 read at the same level both times. Child #6 read L28 at an instructional level on both occasions. The rate for this test is not as easily compared as the Neale assessment, so no analysis is made here.

14
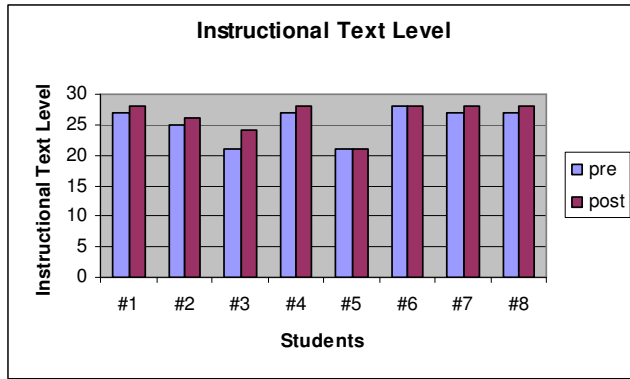
Figure 18: Reading – Running Record
Individual Students – Instructional Text Level

WRITING: Teacher generated

Table 12: Writing Test Summary: Individual Students #1-4 (Intervention Group)

	#1		#2		#3		#4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Correct	14	20	14	30	10	17	12	22
Xo	4	0	4	0	3	3	4	0
Xr	17	16	13	7	14	13	13	14
Both xo xr	2	1	6	0	10	4	8	1
Time	395sec	473secs	339secs	416secs	357secs	410secs	476secs	440secs

Table 13 : Writing Test Summary: Individual Students #5-8 (Control Group)

	#5		#6		#7		#8	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Correct	10	13	21	22	18	26	18	18
Xo	1	1	3	5	3	3	2	0
Xr	16	12	10	7	12	6	14	16
Both xo xr	10	11	3	3	4	2	3	3
Time	448sec	385sec	378sec	283sec	415sec	251sec	304sec	344sec
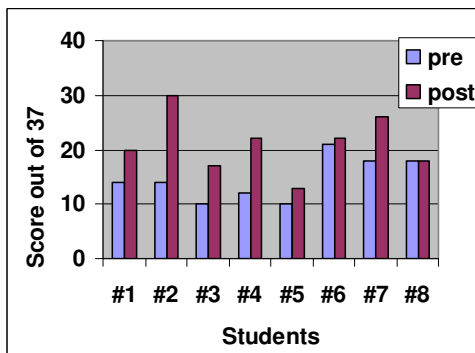
Figure 19: Writing - Words in isolation
Individual Students – Score out of 37
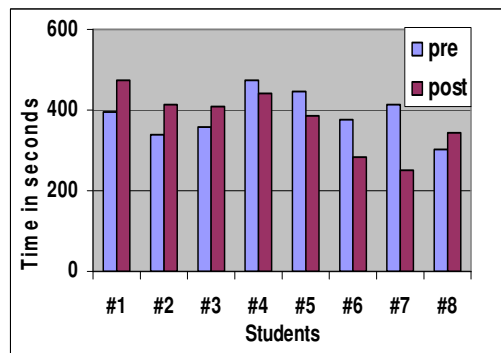
Figure 20: Writing -Words in isolation
Individual Students – Time in seconds

All intervention students made considerable progress in accuracy but this required more time except for Child #4. Child #2 found it effective to think aloud - articulating the word, applying onset and rime segmentation, writing, checking, self-correcting.
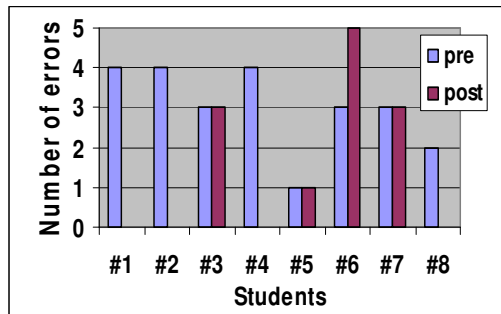
Figure 21: Writing Errors
Individual Students: Incorrect Onset
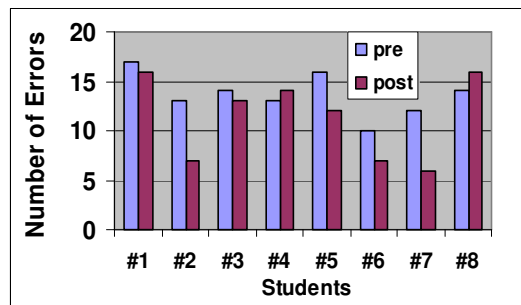
Figure 22: Writing Errors
Individual Students: Incorrect Rime

Figure 21 shows students #1, 2 and 4 had no post-test onset errors, indicating the intervention's impact. Figure 22 shows less improvement in rime errors compared with the control group. But it must be noted that some of their errors were represented by phonetically similar rime units e.g. Child #4 wrote snale (snail) and wheet (wheat).

Child #1 missed three sessions due to illness. Four rime units were introduced and the mid-intervention consolidation took place during the absence. This impacted on post-test results (four words - three incorrect rime errors).

All students had least success with rime units introduced in the last two sessions *ail, ain, eat* (two vowel men go out walking, the first one does all the talking) and *ale, ake, ame, ate, ice, ide, ine, oke* (where the 'magic e' makes the vowel man say his own name). For some of these rimes, there are alternatives e.g *ame/aim*.

"Double errors" reduced noticeably for each intervention member. Students looked carefully at what they wrote, sometimes revised, occasionally self-corrected. Pre-test Child #3 wrote *slam* for *spray*. In post-test, the attempt was *spay*. *Thrill* was written *thely* in the pre-test but *threle* in the post-test. Although not correct, definite progress was apparent.
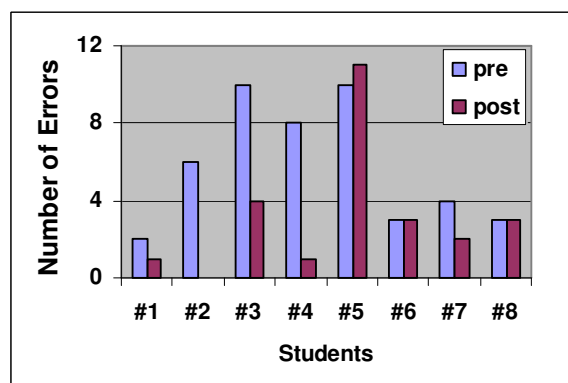
Figure 23: Writing Errors
Individual Students: Incorrect Onset and Rime ('Double Errors')

SELF-EFFICACY

Although not specifically investigated, anecdotal evidence and parental feedback indicated that intervention students felt more positive about both processes and more confident in their approach. The ERIK Self-Efficacy tests showed students having higher perceptions of themselves as learners. Two of the four students felt very confident in all respects. Students pinpointed comprehension-related issues as future focus areas. This trend would indicate that, as a result of the intervention, the students saw themselves as 'self-teachers', became aware of their strengths and improved their metacognitive skills.

DISCUSSION

In this current project, the intervention group's positive trends in reading accuracy at the individual word level supported the hypothesis. As a result of explicit teaching, they had a much stronger understanding of onset and rime. Their rime unit test scores improved slightly more than the control group. There were fewer hesitations and more self-corrections. 'Double error' results decreased dramatically when compared with the control group. The intervention impacted positively on their word level reading.

The prediction that accuracy in prose reading level would increase was strongly supported. In the Neale Reading Analysis and Running Record data, the intervention group showed greater improvement in accuracy compared with the control group. There was also improved comprehension which, as Allington (1998) stated, is the ultimate goal. So again, the explicit teaching was beneficial to the group.

Reciprocal gains for accuracy in writing were also strongly supported by data. By breaking words into onset and rime, the teaching group was more conscious of what they were hearing and recording. The intervention students applied increased onset knowledge but some rime units still need further consolidation. They monitored and revised their work. Anecdotal evidence indicated they were making and using connections between the reading and writing processes.

The time taken to do most tests (except for writing) did improve, but less so than for the control group. Yet what they did in their time was valuable. They employed strategies to solve words, rather than randomly guessing the unknown. Elements of metacognition were apparent. They implemented actions based on their positive self-scripting. *How will I solve*

this? Is my answer right? Do I need to change it? If so, what will I change and how? Child #2 found it more effective to 'think aloud' when writing by articulating the word, applying onset and rime segmentation, writing, checking, self-correcting - working on the unknown using the newly learnt strategies. The actions of the other students indicated that they were also working through these processes. So, although the automaticity element of the hypothesis was not technically supported, there were positive reasons for this trend. Perhaps, the students may have needed more time to integrate and automatise the knowledge and skills. If the intervention had been longer, there may have been an increase in automaticity.

Research indicated that children find it easier to use onset-rime rather than individual letters. As already stated, the students slowly articulated words when reading and writing, segmenting into onset and rime. This concurred with the earlier research.

Juel and Minden-Cupp (2000) suggested that children needed a good knowledge of consonants and vowels for rime analogy to be effective. All students in the project had already acquired this knowledge. The intervention was most beneficial to students #2 and #3. Comparisons between their pre and post-tests scores indicated that they needed to consolidate and apply their knowledge of letter clusters to reading and writing. The explicit teaching facilitated this development. Students #1 and #4, on the other hand, were applying more letter cluster knowledge to reading, were using analogy better from the start and could see applications to multisyllabic words that contained the rime unit. The effectiveness of this process depends on the timing in the child's development.

As Badian (2001) suggested, word level processing impacts on comprehension, engagement and confidence. Inefficient word level processing often leads to slow, stilted reading. Without phrasing and fluency, comprehension is difficult. Without comprehension, reading loses its purpose and motivation decreases. In the current study, improved word level processing resulted in increased comprehension. The intervention students became more active learners and gained confidence because they knew they had effective strategies which they could employ.

This project would suggest that onset and rime should be explicitly taught, probably in Grade One, once letter knowledge is established. Analogy, regularly modeled as an effective strategy, would be beneficial for all students. Directing children to use the known to solve the unknown enables them to see themselves as 'self-teachers'. At all times,

educators need to encourage active rather than passive learning. Teachers are there to scaffold the learning process but the child's ownership of it is essential.

Making links between reading and writing needs to be demonstrated and encouraged so that children apply the knowledge they already have in whatever way is needed. As Salinger (2003) suggested, teachers should be aware of the value of reciprocity. By using writing errors as an indicator of reading deficits, teachers can instruct students at their point of need.

Reinforcing a strategy in various ways helps to automatise it. The research suggested that it is important for students to understand that literacy knowledge can be applied in different contexts (reading or writing). They should also realize that their knowledge is transferable to all environments - small group withdrawal room, classroom or home. They can draw on all their knowledge whenever or wherever they are. If this is emphasised in classroom programs, children's learning should benefit.

RAN activities should be integrated from an early age. Students may be able to process more quickly if additional time is allocated for RAN training.

Metacognition, although not specifically investigated in this study, proved to be very powerful, as indicated by Munro (2007). By incorporating elements of metacognition in everyday practice, teachers might empower students to reach their potential with greater ease.

From this study, future research opportunities become apparent. As the length of the intervention could impact on automaticity, it would be valuable to investigate if there is an optimum period of intervention required. Links between Rapid Automatised Naming (RAN) rates and automaticity could be studied to assess the impact. Word level processing and comprehension would be another element for specific research for students of this age. Using research to investigate the power of metacognition, positive self-scripting and self-efficacy could provide new insights into what is required in classroom practice.

Action research is an important tool. In the current project, the power of explicitly teaching onset and rime to young learners was illustrated. Future research may throw light on factors that can further enhance literacy teaching in Australian primary schools.

4

REFERENCES:

Badian, N. A. (2001). Phonological and orthographic processing: Their roles in reading prediction. *Annals of Dyslexia*, 51, 179-203.

Chard, D. J. and Osborn, J. (1999). *Phonics and Word Recognition Instruction in Early Reading Programs: Guidelines for Accessibility.*   http://www.ldonline.org/article/6316 Downloaded 26.4.08.

Clay, M.M. (1991). *Becoming Literate: The Construction of Inner Control*. Portsmouth, NH: Heinemann.

Clay, M. M. (1998). *By Different Paths to Common Outcomes*. York, Maine: Stenhouse.

Clay, M.M. (2001). *Change Over Time in Children's Literacy Development*. Auckland: Heinemann.

.
Clay, M.M. (2005). *Literacy Lessons Designed for Individuals Part Two: Teaching Procedures.*   Portsmouth, NH: Heinemann Education.

DeFord, D.E. and Fullerton, S.E. (2000). Teaching for Reciprocity: Developing a Self-extending System through Reading and Writing. In Reading Recovery Council of North America (RRCNA), *The Running Record A Review of Theory and Practice for Reading Recovery Teachers,* 12, 2, 1-9.

Fountas, I.C., and Pinnell, G.S. (1999). *Voices on Word Matters; Learning about Phonics and Spelling in the Literacy Classroom*. (Eds.) Portsmouth, NH: Heinemann.

Juel, C. and Minden-Cupp, C. (2000). Learning to read words: Linguistic units and instructional strategies. *Reading Research Quarterly,* 35, 4, 458-488.

Munro, J. (1995c).   Explaining developmental dyslexia: Orthographic processing difficulties. *Australian Journal of Remedial Education*, 27, 1, 5-15.

Munro, J (1998a). The Phonemic-Orthographic nexus: the Phonemic-Orthographic Literacy Program. *Australian Journal of Learning Disabilities*, 3, 2, 15-21.

Munro, J (2007). *Course Manual: Literacy Intervention Strategies 472-697*. The University of Melbourne, Faculty of Education.

Salinger, T. (2003). Helping older struggling readers. *Preventing School Failure*, 47, 2, 79-86.

Snowball, D. and Bolton, F. (1999). Spelling K-8: Planning and Teaching. Portland, Maine: Stenhouse Publishing.

Westwood, P. (2001). *Reading and Learning Difficulties: Approaches to teaching and assessment.* Melbourne: ACER Press.

Wood, C. (2000). Rhyme awareness, orthographic analogy use, phonemic awareness and reading: An examination of relationships. *Educational Psychology*, 20, 1, 5-16.

Lecture Handouts

Handout referring to Collins, A., Brown, J.S. & Newman, S.E. (1989). Cognitive apprenticeship: teaching the crafts of reading, writing and mathematics. In L.B. Resnik (ed.) *Knowing, learning and instruction: Essays in honour of Robert Glaser*. Lawrence Erlbaum, Hillsdale, NJ.

Handout (2007) entitled "*Enhancing Reading for At Risk Students – General Strategies*". Catholic Education Office Melbourne and University of Melbourne.

Assessment Resources:
Dalheim, B (2006). *Rime Unit Test*

Early Reading Intervention Knowledge. *Self-efficacy scales* - adapted from those designed by James W Chapman & William E Tunmer, Massey University New Zealand, 2002.

Munro, J. (2007). *Rapid Automatised Naming Test* – Lecture handout.

Neale, M.D. (1999). *Neale Analysis of Reading Ability: Revised*. Melbourne: ACER.

Westwood, P (2001). *Reading and Learning Difficulties: Approaches to teaching and assessment*. ACER Press (Onset and Rime).

Running Record Texts:
AlphaAssess, (2007). Curtain Communications Pty Ltd .
Oxford University Press, Melbourne

Text Level 21	Jenny Feely	*Flying with the Wind.*
Text Level 22	Claire Halliday	*The Laughing Dragon.*
Text Level 23	Jenny Feely	*Tigers, the Big Cats.*
Text Level 24	Claire Halliday	*Skydiving.*

AlphaAssess, (2004). Curtain Communications Pty Ltd
Oxford University Press, Melbourne

Text Level 25	Emma Rossi	*Dolphins to the Rescue.*
Text Level 26	Rowena Foster	*How the Sun and Moon Were Made.*
Text Level 27	Emma Rossi	*Hungry Crocodiles.*
Text Level 28	Jenny Feely	*Surviving the Storm.*

Appendix 1

Teaching Unit: Onset and rime units

The primary area of this project involved teaching a withdrawal group of 4 Grade 2/3 students to understand and utilize the onset and rime strategy (independent variable) in reading and writing. The purpose was to improve accuracy and automaticity in writing one syllable words and in reading at both the word and prose level (dependent variables). Secondary areas included metacognition (self-talk, planning, reviewing), self-efficacy (feeling more confident about themselves, their reading and their writing) and comprehension (as a result of improved fluency).

In Munro's Multiple Levels of Text Processing model (MLOTP), this would fit mainly into the word level as it relates to developing the skills of letter sounds, letter cluster knowledge and word structure. Pertinent to the word level, the following strategies were explained, demonstrated and experienced: rapid retrieval; segmenting and blending; analogy; and matching letter cluster knowledge to a group of letters. It would also fit into the reader's belief section (understanding why it is important to be able to accurately and quickly read/write words) and the self-management and control strategies section of the model (positive self-talk, planning how to read, monitor reading and self-correct if necessary).

Throughout the intervention, students were given opportunities to actively participate in whole group, partner and independent tasks. They reinforced their learning through different modes – hearing/seeing the onset and rime strategy being modelled; hearing the language being used and being able to articulate their learning; manipulating magnetic letters, laminated cards, plastic tiles, spinner wheel; using different coloured writing implements to highlight rime units - textas, pencils, gel pens, whiteboard markers. Each child had an exercise book, a set of laminated rime and onset units, and spinner wheel. Over the weekends, they had the opportunity to take resources home so that they could consolidate their knowledge, share it with their parents, and celebrate their progress.

The progression of steps within the lessons was based on the philosophy of Munro (2008) lecture, Collins et al Model of Teaching and Learning (1989) and as suggested by Catholic Education Office Melbourne and University of Melbourne "Enhancing Reading

for At Risk Students – General Strategies". These handouts were distributed during the course.

Provide students with a list of individual consonants, two and three letter initial blends, digraphs and trigraphs, as well as the rime units.

<u>Session 1:</u>

- It is essential that the students realize they have ownership over their own learning. Explain the aim of the intervention by affirming the students and supportively challenging them. *You already know a lot about reading and writing. I want to show you some helpful hints / tricks so that you can teach yourself even more about reading and writing.*

- Draw the students' attention to the new rime units. *Today we will talk about 'an' words like can and man, and learn how to read and write them correctly and quickly. We are also going to talk, read and write about 'at' words like bat and fat, as well as 'ay' words like day and say.*

- Model onset and rime / blending and segmenting (make and break). Blend and manipulate sounds orally first. Oral language helps build up phonological awareness.

- *Here is the word 'man'. We can break it into m-an where 'm' is the onset and 'an' is the rime.* Use and explain the terminology. The onset is the consonant or group of consonants before the vowel. The rime unit is the vowel and the consonants that follow it. Revise vowels to ensure children have knowledge of them.

- Coach the group by working on several examples with their participation. *Let's do this together. How would we make and break E.g. fan pan?*

- Consolidiate understanding. *Now I'm going to get you to make and break a word by yourself. Here is "ran" so you have a go.* Support and provide explicit feedback. Encourage rapid response once they are familiar with the process.

- Extend existing knowledge by using the strategy of analogy. *Now we can try some different onsets but use the same rime unit "an". If this word says "an", what might this word "span" say?*

- Invite individual students to use an onset they know to help them make a word with that rime unit, then segment it. Students brainstorm other 'an' words. They have

8

individual access to an onset wheel and rime cards which may assist them to generate words. Students provide words while the teacher scribes.

- Children identify their trigger word from the list they devised. Use that to demonstrate positive self-scripting, linking reading with writing. *I know "an". I can use that to help me with other words like Jan and plan. If I can read "plan", I can write it by using onset and rime.* They then write at least four rime unit words, correctly and quickly, in their books and highlight the rime unit. Use the same procedures with "at" and "ay". *Now that I know it, I can do it quickly.*

- Students write a simple story which contains at least one example of each of the rime units. Students read their stories to the group. At the next session, they each read another student's story.

- Provide opportunity to practise their new skills using games.

- Reflection: What have you discovered today that will help you whenever you are reading or writing? On Day One, teacher models e.g. Today we have learnt about the rime units an, at and ay. We have used lots of different onsets. We have learnt how to "make and break" (blending and segmenting). We have discovered how it helps with both reading and writing. We can use analogy to help use what we know about some words to help us with new words e.g. Gran, spat, clay. We can use this new knowledge whenever we read or write. Using the trigger word to help me, I now have a picture of these words in my "mind's eye".

Session Two:

Between sessions, the list of generated words and the 'rime' stories are typed and pasted into the students' books for reference. Begin by reviewing examples of previous rime units. Each child reads another child's story from the last session. Then follow the same procedure as Lesson One. Rime units: ug, op, aw

Session Three: Follow the same procedure as Session Two. Rime units: ing, ick

Session Four: Follow the same procedure as Session Two. Rime units: ank, ump

Session Five: Review previous rime units. Read another child's story from the last session. Use analogy to make connections between known and new rime units with a different vowel. Ensure that the initial word is already consolidated.

E.g. You know rug. What do you think this word might say - rag?

You know drop. What do you think this word might say – drip?

You know spring. What do you think this word might say – sprung?

Children make and break orally and manipulate magnetic letters. They record words and write a story with some of the new words. Games are used to reinforce onset and rime units. The session concludes with review of new learnings.

Session Six: Follow the same procedure as Session Two. (ell,ash, est)

Session Seven: Follow the same procedure as Session Two. (ight, ore)

Session Eight: Follow the same procedure as Session Two. Long vowel sound: Magic e ale, ake, ate, ame, ice, ide, ine, oke

Session Nine: Follow the same procedure as Session Two. Long vowel sound: 2 vowel men – ail, ain, eat

Session Ten: children were given the opportunity to revise all rime units and reinforce through the use of choice of resources.

Appendix 2

RAPID AUTOMATISED NAMING: TIME (in seconds)

INTERVENTION GROUP

	#1 Pre	Post	#2 Pre	Post	#3 Pre	Post	#4 Pre	Post
RANL 1	46	32	38	36	43	39	38	26
RANL 2	34	34	39	37	38	32	31	29
RAND 1	38	35	45	44	41	43	33	32
RAND 2	36	36	43	42	36	38	32	28
Aver	38.5	34.25	41.25	39.75	39.5	38	33.5	28.75

Average Time   Pre-test 38.2   Post-test 35.2

CONTROL GROUP

	#5 Pre	Post	#6 Pre	Post	#7 Pre	Post	#8 Pre	Post
RANL 1	41	37.5	30	29	28	30	36	29
RANL 2	39	36	32	30	33	31	31	29
RAND 1	48	35.5	33	34	30	32	36	31

RAND 2	45	41.5	32	34	32	33	29	31
Aver	43.25	37.625	31.75	31.75	30.75	31.5	33	30

Average Time   Pre-test 35.7   Post-test 32.7

ONSET AND RIME SEGMENTATION: SCORE AND TIME

INTERVENTION GROUP

	#1 Pre	Post	#2 Pre	Post	#3 Pre	Post	#4 Pre	Post
Score/15	10	15	14	15	11	15	13	15
Time in sec	48	36	37	26	45	31	50	37

Average Score   Pre-test 12   Post-test 15
Average Time   Pre-test 45   Post-test 32.5

CONTROL GROUP

	#5 Pre	Post	#6 Pre	Post	#7 Pre	Post	#8 Pre	Post
Score/15	11	11	12	12	11	13	15	15
Time in sec	46	39	61	43	69	41	48	30

Average Score   Pre-test 12.25   Post-test 12.75
Average Time   Pre-test 56   Post-test 38.25

NEALE ANALYSIS OF READING:
ACCURACY, COMPREHENSION AND RATE

INTERVENTION GROUP

	#1 (YOS3)	Post	#2 (YOS2)	Post	#3 (YOS2)	Post	#4 (YOS2)	Post
Pre-test Age	8.7		8.0		7.11		7. 9	
Acc %	34%	59%	50%	48%	41%	56%	74%	77%
stanine	4	6	5	5	5	5	6	6
read age	7.9	8.6	7.2	7.0	6.10	7.3	8.2	8.2
Comp %	42%	55%	46%	47%	24%	60%	40%	85%
stanine	5	5	5	5	4	6	5	7
read age	7.7	8.3	7.1	7. 2	6.3	7.5	6.11	8.3
Rate %	47%	43%	64%	79%	38%	53%	89%	92%

11

stanine	5	5	6	7	4	5	7	8
read age	8.2	8.0	7.10	8.2	6.8	7.4	9.10	9.11

Average Accuracy   Pre-test   49.75%   Post-test   60.0%
AverageComprehension   Pre-test   38.0%   Post-test   61.75%
Average Rate   Pre-test   59.5%   Post-test 66.75%

CONTROL GROUP

	#5 (YOS3)	Post	#6 (YOS3)	Post	#7 (YOS3)	Post	#8 (YOS2)	Post
Pre-test Age	9.8		9.7		8.9		8.0	
Acc %	21%	23%	52%	44%	34%	29%	63%	70%
stanine	3	4	5	5	4	4	6	6
read age	7.1	7.1	8.2	8.0	7.9	7.5	7.8	7.10
Comp %	22%	17%	15%	28%	42%	60%	64%	74%
stanine	3	3	3	4	5	5	6	6
read age	7.1	7.0	6.9	7.5	7.7	8.5	7.7	7.9
Rate %	35%	33%	52%	66%	22%	37%	60%	71%
stanine	4	4	5	6	3	4	6	6
read age	7.4	7.4	8.5	9.2	6.11	7.7	7.7	7.10

Average Accuracy   Pre-test 42.50%   Post-test   41.5%
Average Comprehension   Pre-test 35.75%   Post-test   44.75%
Average Rate   Pre-test 42.25%   Post-test   51.75%

RUNNING RECORD:
TEXT LEVEL, ACCURACY, SELF-CORRECTION, RATE

INTERVENTION GROUP

	#1 Pre	Post	#2 Pre	Post	#3 Pre	Post	#4 Pre	Post
Text L	27	28	25	26	21	24	27	28
Accuracy	94 ½ %	93%	93 ½ %	90%	93%	90.5%	92%	90%
S/C rate	1:2	1:7	1:4	1:7	1:4	1:13	0	1:17
Words	172w	183w	197w	201w	127w	136w	172w	183w
Seconds	200s	190s	416s	187s	192s	218s	175s	200s

Text Level Average: Pre-test 25   Post- Test 26.5

CONTROL GROUP

	#5 Pre	Post	#6 Pre	Post	#7 Pre	Post	#8 Pre	Post
Text L	21 (22hard)	21 (22hard)	28	28	27 (28hard)	28	27	28
Accuracy	95%	95%	91%	92%	95%	90%	93 ½ %	91%
S/C rate	1:4	0	0	1:6	1:2	1:7	1:5	0
Words Seconds	127w-162s	127w-148s	183 w-190s	183w-179s	172w-257s	183w-282w	172w-226s	183w-262s

Text Level Average: Pre-test 25.75   Post-test 26.25

INTERVENTION GROUP   Reading: Rime Unit Test Analysis

/=correct   xo=incorrect onset   xr=incorrect rime   x=incorrect onset and rime   sc=self-correction   o=hesitation

	#1	Post	#2	Post	#3	Post	#4	Post
Time	235sec	220sec	372 sec	333sec	468sec	429 sec	202sec	169sec
In	/ / / /	/ / xr /	/ / / /	/ / sc /	/ / xr /	/ / o /	/ / / /	/ / / sc
An	/ / xr xr	/ / / xr	/ / xr sc	/ / xr sc	/ / o /	/ / o /	/ / / xr	/ / / /
Ay	/ / / /	/ / sc /	/ / / /	/ / / /	/ / / o	/ / / /	/ / / /	/ / / sc
Aw	/ sc / o	/ / / sc	/ / / x	/ xr / o	/ xr / xr	/ xr / xr	/ / / o	/ / / /
Ab	/ / / /	/ / sc /	xo / o /	xo / / /	x o o o	x / o o	/ / / /	/ / / /
Ug	/ / / /	/ / / /	xr xr x o	xr sc o /	xr xr o o	xr xr / /	/ / xr /	/ / / /
Ot	sc / / /	/ / / /	/ / / x	/ / o xr	/ sc xr xr	/ / o sc	/ / / /	/ / / /
At	/ / xr /	/ / / /	/ / x o	/ / o /	/ xo o /	/ / o /	sc / xr /	/ / / /
Ap	sc xr / /	/ sc / /	o / xr /	sc / o /	xr o xr o	xr / o /	/ / / /	/ xr / /
Op	/ / / xr	sc / / /	xr / / sc	sc / / /	/ / / /	/ / / /	/ sc / /	/ / / /
Ip	/ / / /	/ / sc /	/ xr / o	/ / / /	/ o o o	/ / o /	/ / / /	/ / / /
It	/ / / /	/ / / sc	/ xo x /	/ / o /	/ o / o	/ / o o	/ xr xr sc	/ / sc /
Ock	/ / / /	/ / / /	/ / / /	/ / / /	/ xr o o	/ / / /	/ xo / /	/ xo / /
Ell	/ / / /	/ / / /	/ / / /	/ / / /	xr xr xr xr	o / o xr	/ / / /	/ / / /
Ack	/ / / /	/ / / /	/ xo xo xr	/ xr xosc	/ xr / xr	/ xr / xr	/ / / /	/ xo sc /
Ill	/ / / sc	/ / / /	xr / / /	/ / sc o	/ xr o o	/ / o /	/ / / /	/ / / /
Ing	/ / o /	/ / / /	o o / xr	/ / / /	/ / / /	/ / o /	/ / / /	/ / / /
Uck	/ o / /	/ / / /	/ / o xr	/ / / /	/ / / o	/ / / xr	/ / / /	/ sc / /
Ick	/ / / /	/ sc / /	xr o xr sc	sc / / xr	xr / o xr	o xr xr /	/ / / /	/ / / /
Ail	/ / / sc	/ / / /	o / / x	/ / / /	/ o o o	xr / / xr	/ / / /	/ / / /
Ank	/ / sc /	/ sc / sc	xr xr / o	/ / / o	o xr xr xr	o / o xr	/ / sc /	/ / / /
Ask	/ / xr	/ / xr	xr xr xr	sc xr xr	o sc x	xr xr xr	/ / /	/ / sc
Unk	/ xr xr /	/ sc / /	/ / x sc	/ / xr o	/ o xr o	o xr xr o	/ / / /	/ / / /
Ink	/ sc / xr	/ / / xr	/ o / o	/ o / xr	o o / o	/ o o xr	sc / / xr	/ / / xo
Ump	/ / / /	/ / / /	/ / / /	/ / / /	/ xo o /	/ / / /	/ / / /	/ / / /
Est	/ / / xo	/ / / xo	/ / o xo	/ / / sc	o / o x	/ / o xr	/ / / /	/ / / /
Ight	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /
Eat	/ / / /	/ / sc /	/ sc sc xr	xr xr xr xr	xr xr xr x	/ xr o xr	/ sc xr /	/ / o /
Ake	/ / sc /	/ / xr /	/ / xo /	/ / / /	/ / xr /	/ / sc xr	/ / o /	/ / / /
Ate	/ / / /	/ / xr /	o / xr /	/ o / xr	/ / x x	/ / o xr	/ / xr /	/ / / /
Ame	/ xr / /	/ / xr /	/ xr xo sc	/ / sc xr	/ xr xr x	/ xr o xr	/ / / /	/ / / /
Ice	sc / / /	/ / / /	sc / xr /	/ / / o	/ xr xr xr	/ / xr xr	/ / / /	/ / / /
Ide	/ / / /	/ / / xr	/ / / x	/ / xo o	/ / / x	/ xr / xr	/ / / /	/ / / /
Ine	/ / / xo	/ / / /	/ o / /	/ / / o	/ xr xr xr	o xr xrxr	/ / / x	/ / / /
Ore	/ / / /	/ / / /	xr x / sc	/ / / o	/ xr / /	/ / o /	/ / / xr	/ / / /
Oke	/ / xr xr	/ / / /	xr / / /	xr / / /	xr xr o o	xr xr xr o	xr xr / /	sc xr / /
Ain	/ / / /	/ / / xr	/ xr / o	/ xr xr /	/ xr / xr	xr xr xr sc	/ xr xr /	/ xr xr /
Ale	x / / /	/ / / /	/ / / o	/ / / /	xr xr xr xr	/ / xr xr	/ / / /	/ / / /
Auto+corr	122	127	82	101	57	75	126	134
Correct including	134 (9sc,3o)	139 (12sc)	109 (9sc18o)	127 (11sc15o)	95 (2sc36o)	106 (3sc 28o)	134 (6sc 3o)	142 (7sc 1o)
Errors	15	10	40	22	54	43	15	7
Types of errors	2xo 12xr 1x	1xo 9xr 0x	7xo 24xr 9x	3xo 19xr 0x	2xo 44xr 8x	0xo42xr 1x	1xo13xr 1x	3xo 4xr 0x

14

CONTROL GROUP   Reading: Rime Unit Test Analysis

/=correct   xo=incorrect onset   xr=incorrect rime   x=incorrect onset and rime   sc=self-correction   o=hesitation

	#5	Post	#6	Post	#7	Post	#8	Post
Time	450	405	174	167	436	368	266	215
In	/ / xr /	/ xo xr /	/ / / /	/ / / /	/ / / /	/ / / /	/ / / /	/ / / /
An	/ / / xr	/ / / xr	/ / / /	/ / / xo	/ / xr xr	/ / xr xr	/ / xr xr	/ / xr xr
Ay	/ / / o	/ / / /	/ / / /	/ / / /	/ / / /	/ / / /	/ / / /	/ / / /
Aw	xr o sc x	/ / / x	/ / / xr	/ / / /	/ xr / xr	/ / / x	/ xr / xr	/ / / xo
Ab	x / / sc	/ / o o	/ / /xo	xr / / xo	/ xr / /	/ / xo o	xr o / /	/ / / /
Ug	xr sc / /	xr / o xr	/ / / /	/ / / /	o / / sc	/ sc / /	/ / x xr	/ / xr /
Ot	/ / / o	/ sc o /	/ sc xr /	/ / / /	/ / xr /	/ / sc xo	/ / xr sc	sc / xr xr
At	/ / o /	/ / / /	/ /xr /	/ / xr /	/ / x /	/ / o /	/ / xo /	/ / xo /
Ap	xr / xr xr	xr / / xr	/ / / /	/ / / /	xr / xr o	Xr / o o	xr / / /	/ / / sc
Op	/ / / /	/ / / /	/ / / /	/ / / /	/ / / /	/ / / /	/ / / /	/ / / /
Ip	/ xr xo /	/ / sc /	/ / / /	/ / / /	/ / / o	Xr / / o	/ / / /	/ / / /
It	/ / o x	/ sc / xr	/ / / /	/ / / /	/ / x o	/ / / x	/ / / o	/ / / sc
Ock	/ / / /	/ / / /	/ / / /	/ / / /	/ / / /	/ xo / /	/ / / /	/ / / /
Ell	xr / o xr	/ / / xr	/ / / /	/ / / /	/ o / /	/ / / /	/ / / /	/ / / /
Ack	/ / / xr	sc xr / xr	xo / / /	/ xo / /	/ o o /	xo / / o	/ / / /	/ o / /
Ill	/ / o /	/ / o /	/ / / /	/ / / /	/ / / o	/ / / /	/ / / /	/ / / /
Ing	x / xr /	/ o / /	/ / / /	/ / / /	/ / / /	/ / / /	o xo / x	/ / / /
Uck	/ xr / xr	xr xr / xr	/ / / /	/ / / /	/ / / /	/ xr / /	/ xr / /	/ / / /
Ick	xo / xr xr	/ / sc /	xo / / /	/ / / /	/ / / sc	/ o / xr	/ / / xr	/ / / xr
Ail	xr / / xr	xr xr x xr	/ / / /	/ / / /	/ / / sc	/ / / o	o o o /	sc sc / /
Ank	o / xr xr	/ / xr /	/ / / xr	/ / / /	/ / xr x	/ / / o	xr / / x	/ / / xr
Ask	/ / o	o / xr	/ / xr	/ / /	/ / o	/ / /	/ o /	/ / /
Unk	/ xo / xo	o xr o /	/ / / xr	/ / / /	o o o o	/ xr xr x	/ xr / o	/ xr / /
Ink	/ / / xr	/ xr / /	/ / / /	o / / sc	/ / / o	/ o / xr	xr xr xr o	/ / o /
Ump	/ / xo /	/ / / /	/ / / /	/ / / /	/ / / xr	/ / / xr	/ / / /	/ / / /
Est	/ / / /	xr / o /	/ / / xo	/ / / /	/ / / xr	Xr / / x	/ / / xr	/ / / o
Ight	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /
Eat	/ xr xr o	xr xr xr x	/ / / xo	/ / / /	sc sc o xr	/ xr xr /	/ / xr o	/ / o o
Ake	/ / / /	/ / xr /	/ / / /	/ / sc /	/ / xo /	/ / o /	/ / xo /	/ / / /
Ate	/ xr / xr	o xr / xr	/ / / /	/ / / /	/ xr / sc	/ / o /	/ x / /	/ / / o
Ame	/ xr x xr	/ xr xr xr	/ / / /	/ / / /	/ xr / x	/ xr o /	/ / / xr	/ xr / xr
Ice	xr xr xr xr	/ xo xr xr	/ / / /	/ / / /	/ o / xr	/ / / /	/ / / /	/ / o /
Ide	/ / / xr	o xr / x	/ / / xr	/ / / /	/ / / o	/ / / /	/ / / /	/ / / /o
Ine	xr xr x xr	xr xr x xr	/ / / xr	/ / / /	/ / / xr	/ / xr xr	/ / sc /	/ / / /
Ore	/ x / xr	/ o / /	/ / / xo	/ / / /	/ o / o	/ / / /	/ / / /	/ / / /
Oke	xr xr xr xr	xr xr / xr	/ / / /	/ / / /	xr xr / /	/ / / /	/ / / /	/ / / /
Ain	xr xr xr xr	xr xr xr xr	/ / / /	/ / / /	/ / / xr	/ sc / /	/ xr / /	/ xr / /
Auto+corr	76	77	134	141	97	109	111	122
Correct including	89 3sc 10o	95 5sc 13o	135 1sc 0o	144 2sc 1o	122 6sc 19o	124 3sc 12o	123 2sc 10o	134 4sc 8o
Errors	60	54	14	5	27	25	26	14
Types of errors	5xo 47xr 8x	2xo 45xr 7x	6xo 8xr 0x	2xo 3xr 0x	1xo 22xr 4x	4xo 17xr 4x	3xo 19xr 4x	2xo 12xr 0x

INTERVENTION GROUP Writing words in isolation   Word Analysis

Writing words in isolation   / = correct   xo = incorrect onset   xr = incorrect rime   xo xr = incorrect onset and rime

	#1 395sec	Post 473sec	# 2 339sec	Post 416	#3 357sec	Post 410sec	# 4 476sec	Post 440sec
Twin	xo	/	/	/	xr	/	xr	xr
Flan	xr	/	/	/	/	/	/	/
Spray	/	/	xo	/	xo xr	xo	xo xr	/
Straw	xr	xr	xr	xr	xo xr	xr	xo xr	xr
Glug*	xr	xr	/	/	xo xr	xr	xr	/
Splot*	/	/	xo	/	xo	/	/	/
That	/	/	/	/	/	/	/	/
Clap	/	/	/	/	/	/	/	/
Plop	/	/	/	/	/	xo	/	/
Grip	/	/	/	/	/	/	/	/
Spit	/	/	/	/	/	/	/	/
Shock	xr	xr	xo xr	xr	xr	/	xr	xr
Swell	xr	/	xr	/	xr	xr	xr	xr
Quack	xr	xo xr	xo xr	/	xo xr	xo	xo xr	xr
Thrill	xo xr	/	xr	/	xo xr	xr	xo xr	xr
Sting	/	/	/	/	xr	/	/	/
Crash	/	/	/	/	/	/	xo	/
Pluck	xr	xr	/	/	xr	xr	xr	xr
Trick	xr	xr	xr	/	/	/	xo	xr
Frank	xo	/	xr	/	xo	xr	xo xr	/
Drunk	/	/	xo xr	/	xr	xr	xr	xr
Blink	/	/	/	/	xo	xo xr	/	/
Thump	xo	xr	xr	/	xr	xr	xr	/
Chest	/	/	/	/	/	/	/	/
Fight	xr	/	xr	/	xr	xr	xr	/
Snail	xr	xr	xr	xr	xr	xr	xo	/
Wheat	xr	xr	xo xr	xr	xo xr	xo xr	xo	xr
Brain	xr	xr	xo xr	xr	xo xr	xo xr	xo xr	/
Skate	xr	xr	xr	/	/	/	xr	/
Blake	xo	/	xr	/	xo xr	xo xr	xr	xr
Stale	xr	xr	/	/	xr	xr	xr	xr
Frame	xr	xr	xr	/	xo xr	xr	xo xr	xr
Slice	/	xr	xr	/	xr	/	/	/
Pride	xo xr	xr	xo	/	xr	/	/	xr
Shrine	xr	xr	xo xr	xr	xr	xr	xo xr	xo xr
Score	/	/	xo	xr	xo xr	/	xr	/
Smoke	xr	xr	xr	/	xr	/	xr	/

	#1	Post	# 2	Post	#3	Post	# 4	Post
correct	14	20	14	30	10	17	12	22
Xo	4	0	4	0	3	3	4	0
Xr	17	16	13	7	14	13	13	14
xo and xr	2	1	6	0	10	4	8	1

16

CONTROL GROUP Writing words in isolation   Word Analysis

Writing words in isolation   / = correct   xo = incorrect onset   xr = incorrect rime   xo xr = incorrect onset and rime

	Child 5 448sec	Post 385sec	Child 6 378sec	Post 283sec	Child 7 415sec	Post 251sec	Child 8 304sec	Post 344sec
Twin	xo xr	xo xr	/	/	/	/	Xr	/
Flan	/	/	/	/	xr	/	Xr	/
Spray	/	/	/	/	xo xr	/	Xr	xr
Straw	xr	xr	xo xr	xo xr	xo xr	xo xr	Xr	xo xr
Glug*	/	/	/	xo	xr	xr	/	/
Splot*	/	/	/	/	/	/	/	/
That	xo xr	/	/	/	/	/	/	/
Clap	/	/	/	/	/	/	Xr	/
Plop	/	/	/	/	/	/	/	/
Grip	/	/	xr	/	/	/	Xo	xr
Spit	/	/	/	/	/	/	Xr	/
Shock	xr	xr	/	/	/	/	Xr	/
Swell	xo xr	xo xr	xo xr	xr	xr	xr	Xr	xr
Quack	xo xr	xo xr	xo	xo xr	xo	xo	xo xr	xr
Thrill	xo xr	xo xr	xo xr	xo	xo	xo	xo xr	xr
Sting	/	/	/	/	/	/	/	/
Crash	xr	/	xr	/	/	/	/	xr
Pluck	xr	xr	/	/	xr	/	Xr	xr
Trick	xr	xo xr	/	xr	/	/	/	xr
Frank	xr	xr	xo	/	/	/	/	/
Drunk	xo xr	/	/	xo	xr	xr	/	/
Blink	xr	xo xr	/	/	xr	/	/	xr
Thump	xo	/	xr	xr	/	/	/	/
Chest	/	xo	/	/	/	xo	/	/
Fight	xr	xr	/	xo xr	/	/	Xr	/
Snail	xr	xr	xr	/	xo	/	Xr	xr
Wheat	xo xr	xo xr	xr	xr	xr	xr	xo xr	xr
Brain	xr	xo xr	xr	xr	/	/	Xr	xr
Skate	xr	xo xr	xr	xo	xo xr	xo xr	/	xo xr
Blake	xr	xo xr	xr	xr	xr	xr	/	xr
Stale	xr	xr	xr	xr	xr	/	/	/
Frame	xo xr	xr	xr	/	xr	xr	/	/
Slice	xr	xr	/	/	/	/	Xr	xr
Pride	xo xr	xr	/	/	/	/	Xr	/
Shrine	xo xr	xo xr	xo	xo	xo xr	/	Xo	xo xr
Score	xr	xr	/	/	xr	/	/	xr
Smoke	xr	xr	/	/	xr	/	/	xr

correct	10	13	21	22	18	26	18	18
Xo	1	1	3	5	3	3	2	0
Xr	16	12	10	7	12	6	14	16
Xo and xr	10	11	3	3	4	2	3	3

APPENDIX 3

Teacher generated writing test

Writing words in isolation **(including two pseudo-words)** **that contain dependable rime units**

twin	flan	spray	straw	glug*
splot *	that	clap	plop	grip
spit	shock	swell	quack	thrill
sting	crash	pluck	trick	Frank
drunk	blink	thump	chest	fight
snail	wheat	brain	skate	Blake
stale	frame	slice	pride	shrine
score	smoke			

Student copy of common onsets and rimes.

b	bl	scr
c	br	spl
d	cl	spr
f	cr	str
g	dr	
h	fl	
j	fr	
k	gl	ch
l	gr	qu
m	pl	sh
n	pr	th (1)
p	sc	th (2)
r	sk	Wh
s	sl	
t	sm	
v	sn	
w	sp	thr
x	st	shr
y	sw	squ
z	tr	
	tw	

at	ug	ore
it		
ot	ell	ump
	ill	
in		est
an	ack	
	ock	ight
ap	uck	
ip	ick	ash
op		
	ank	ing
ail	unk	
ain	ink	aw
eat		
		ay

ale   ake   ate   ame   Ice   ide   ine   oke