

## **Action Research**

### *Hypothesis*

Explicit training in phonemic segmentation skills, alongside training in using rime-analogies, will result in improved reading of mono-syllabic words containing the rime units taught.

### **ABSTRACT**

There can be several factors that influence a child's performance in learning to read. The two Year 2 students in this study, were selected by their school as students who were having ongoing difficulties in acquiring literacy skills and who currently were not receiving any other intervention to address their difficulties. Initial testing indicated difficulty with phonological awareness skills.

This study sought to test the hypothesis that explicit teaching of rime units and developing skills in segmenting sounds, would lead to an improvement in reading mono-syllabic words containing the rime units taught.

The two students concerned, were withdrawn from class for explicit teaching sessions that focused on improving segmentation skills and the teaching of fifteen rime units, across a ten lesson span. The students were assessed on a number of tasks prior to the investigation and at its conclusion. Data collected from these assessments, indicated the hypothesis was confirmed and that teaching rhyme units and segmentation skills produced improved outcomes in word reading for these students. An unanticipated bonus of the program, was that students were able to generalize learning to read words which had not been taught during the investigation.

## INTRODUCTION

Much research has been done in recent years in the area of phonological awareness and its contribution to the development of reading skills. It is a central notion in this investigation. Before moving to the specifics of the investigation, it is relevant to review current theories/knowledge concerning this broad topic.

“Tests of children’s phonological awareness, which assist the ability to reflect upon and manipulate the sound structure of spoken words, are among the best predictors of progress in learning to read”(Macdougall & Hulme: 1994). There has been a range of studies in recent years attesting to the truth of this quote. Phonological awareness is taken to mean the ability to recognize the sound units of language and to manipulate them. For example by recognizing the number of syllables in a word, that words rhyme, or that words start with the same sound. One aspect of phonological awareness is phonemic awareness. This refers to the ability to identify and manipulate individual phonemes or sounds – such as knowing a word like bat is composed of three different phonemes and that each of these phonemes may be replaced by a different sound to create a new word.

However studies in which children have been trained to improve their phonological abilities alone, have not produced convincing results according to Muter (1994). Rather, as Hatcher, Hulme and Ellis (1994) found in their study, training in phonological skills needs to be explicitly linked to experiences in learning to read and spell to bear positive results.

Phonological awareness occurs at the level of syllables, onset-rime and phonemes and it is argued that these different levels are most strongly related to reading at different points in a child’s development. Onset refers to the initial consonant or consonant blend and rime to the vowel and to any final consonant or consonants. Drawing on studies showing behavioural evidence from adults, Treiman conducted a series of experiments involving segmentation of syllables into onsets and rimes. The first of these experiments showed that the 8 year olds involved confirmed the hypothesis that the rime is a natural constituent of the syllable, whereas the initial consonant-vowel is not. The experiments also provided evidence that the onset of the syllable is a cohesive unit. Also results suggested that at least by 5 years or so, tasks that require the analysis of syllables into onsets and rimes are easier than tasks that require the analysis of syllables into other units (Treiman: 1985). Goswami (1988, in R&D) also found that children were able to use knowledge of rimes to correctly read an unknown word sharing the same rime. This constitutes one means of reading by analogy. Later, she was able to show that children were also sensitive to the words orthographic patterns and they were not rhyming indiscriminantly (1990, in R7D). According to Goswami (1994), onset-rime skills are present before children begin to read and phonemic awareness develops largely as a

consequence of learning to read and to spell. According to both these researchers, phonemic analysis tasks that can be solved on the basis of an onset-rime analysis would be easier than phonemic analysis tasks that require onsets and rimes to be sub-divided.

An advantage for educators in employing onset-rimes, in teaching word recognition, is that the complexity of vowel generalizations is reduced. In beginning reading material, the vowel sounds are generally quite stable in rimes. Additional advantages to using onset-rimes, according to Hudson, are the reduced memory requirements of shorter strings of letters/sounds; it alerts the learner to possible reading and spelling similarities; allows the learner to decipher visually unfamiliar words; allows unfamiliar words to be introduced more rapidly; gives the learner more access to reading at a higher level (Hudson, 1996).

In a further study in 1995, Leslie and Calhoun traced the effect of rime neighbourhood size, or the effect of the frequency that one syllable words with the same rime, had on a group of first and second grade students. They found that rimes from large neighbourhoods were read more correctly more often in lists and stories, than rimes from moderate or small neighbourhoods. Their conclusion was that as children learn to read they become increasingly sensitive to rime neighbourhood size. A proposed explanation is that the repetition involved “establishes stronger orthographical-phonological connections between spellings and pronunciations in memory for the more frequently occurring rimes (Ehri: 1992 in Leslie & Calhoun).

Of the tasks used to measure phonological awareness in research studies, certain tasks are better predictors of reading and spelling success than others. According to Adams (1990) the skills, which are more difficult and acquired later (such as phoneme segmentation and manipulation) yield stronger predictions of reading development than the earlier acquired skills. There is also a reciprocal aspect to this development, with reading development leading to an increase in phonological awareness.

However studies in which children have been trained to improve their phonological abilities alone, have not produced convincing results according to Muter (1994). Rather, as Hatcher, Hulme and Ellis (1994) found in their study, training in phonological skills needs to be explicitly linked to experiences in learning to read and spell to bear positive results.

As has been noted earlier, one aspect of phonological awareness is phonemic awareness. Phonemes are the smallest units of spoken language and phonemic awareness refers to the ability to focus on and manipulate phonemes in spoken words. Along with letter knowledge, it is one of the best predictors of how well children will learn to read (Ehri et al. 2001).

It is thought to contribute to children’s ability to read words, in various ways. Blending skill is needed to transform graphemes (the units of written language which represent phonemes in the spellings of words) into recognizable words. Reading words by analogy requires onset-rime segmentation and blending skill. Reading words from memory by sight requires phoneme segmentation skill and storing individual sight words in memory,

requires children to match up graphemes to phonemes in the word and retain these connections in memory ( Ehri et al. 2001).

From a meta-analysis of research work they carried out on phonemic awareness, Ehri et al. produced a number of findings. The benefits of instruction in phonemic awareness were replicated many times and findings were uniformly positive. There was support for the claim that PA instruction is more effective than alternative forms of instruction or no instruction in teaching PA, and in helping children acquire reading and spelling skills.

One finding of the analysis was that the effects of PA instruction on “at risk” readers increased on the follow-up post, test from the immediate post-test. They speculated that because the subjects were preschoolers, kindergarteners, or first graders with low PA and limited reading skills when the training began, it took time following training for their reading skills to develop and gain the maximum benefit from PA instruction.

Instruction was also found to be more effective when the number of PA skills taught was restricted to one or two, e.g. segmenting words into phonemes and blending phonemes, and instruction was more effective when the application of skills was also taught. Combining the teaching of letters with phonemic awareness skills also proved to be more effective than simply teaching PA as it helped children make the transfer to reading and writing. Letter learning requires retaining shapes, names, and sounds in memory and overlearning them so that letters can be processed automatically in reading and writing words (Adams, 1990 in Ehri et al.). Children also needed to be taught to apply phonemic skills during reading and writing to maximize gains made.

Yet another finding from the meta-analysis study, was that small group instruction was associated with much larger effect sizes than individual or classroom instruction, although the researchers noted that this was a tentative finding and further research was needed to confirm this inference.

The current investigation, involves two children towards the end of their third year of schooling, with poor phonological awareness skills and a low level of text reading compared to their peers. They are “at risk” of failing to acquire appropriate reading skills without intervention to address their needs. A 1997 study by Greaney, Tunmer & Chapman, has particular relevance to the needs of the children concerned. This study aimed to investigate whether systematic training in the use of rime-based strategies for reading unfamiliar words, integrated with meta-cognitive strategies for how and when to apply such strategies, would produce positive effects in reading disabled children that would generalize to other reading skills and materials. The authors of the study propose a possible explanation for the difficulty disabled readers experience. This is that they possess the necessary skills and knowledge (i.e. onset-rime segmentation skill, knowledge of initial letter sounds, basic sight vocabulary) to take advantage of rime unit analogies but do not make use of such skills and knowledge when confronted with unfamiliar words. Instead they rely on ineffective or inappropriate learning strategies, such as partial letter-sound cues. They drew on previous research conducted by Ehri & Saltmarsh (1995, which supported this proposal. They had discovered that disabled readers were particularly deficient in remembering letter details in the middle of words. This results in the words being insufficiently imprinted in lexical memory. Also, because

there is less interaction between orthographical and phonological codes in the word processing of disabled readers who rely on partial word level cues and contextual guessing the development of individual phonemes may not be promoted to the same extent as in normally developing readers.

The research findings were that the disabled readers (Ave. age- 8.5 years) were deficient in their spontaneous use of rime bases analogies, despite having reasonably high levels of onset-rime segmentation ability. They failed to make use of the knowledge they had to read unfamiliar words.

They also found that the positive effects of the meta-cognitive strategy training in the use of rime spelling units generalized to performance on a standardized reading test (the Burt word test). The rime-analogy group also outperformed an item-specific training group on a pseudo word-reading task, the rime-unit identification task and the reading words with the common rime unit task, although not on the Burt Word Test. The researchers concluded that teaching orthographic units corresponding to rimes is a very useful first step in making disabled readers more aware of the connections between written and spoken words and in helping them overcome a tendency to focus on boundary letters at the expense of medial information.

My investigation intends to examine the effect of training in phonemic segmentation skills and rime analogy training, on two “at risk” Year 2 students.

### *Hypothesis*

Explicit training in phonemic segmentation skills, alongside training in using rime-analogies, will result in improved reading of mono-syllabic words containing the rime units taught.

## **METHOD**

### *Design*

This study uses a case study design, in which the literacy ability of the two students was assessed and a strategy designed to address some of the fundamental difficulties the students were experiencing. The action plan was carried out and further assessment undertaken to track any movement in the student’s performance.

### *Participants*

The participants in the study were two Year 2 students, identified as being “at risk” and nominated for the study by the school’s CLaSS Coordinator. The school had not participated in the CLaSS program until this year and neither of the students had been involved in the Reading Recovery program in Year 1. At the beginning of the year, the class teacher had assessed their text reading levels as follows- Student A: 0, Student B: 1. The entry age of the two students concerned is shown below, along with pre-program assessment results.

### *Procedure*

The students were withdrawn together from class on a daily basis for two weeks. Each session was approximately 45 minutes long. Fifteen rime units were taught. Ten of these were two letter rime units, the rest contained three letter rime units. The first four lessons began with activities (picture-letter matching) to teach and consolidate the sound-symbol correspondences that were not known. All sessions contained a phoneme segmentation activity. Once three phonemes could be segmented accurately words containing four were presented. From lessons 5, this activity was extended with students writing the words they had segmented orally. One new rime was taught in session one, 2 in sessions 2 to 8. Rimes were taught using word family charts with the rime highlighted in a contrasting colour, and reinforcement games. In each session, rimes taught previously were revised. The students also read text, containing rimes that had been taught. At the end of each teaching session students were asked to articulate the learning that had occurred.

## **RESULTS**

### *Information Gathered from Pre-Program Testing*

**Student A : Age – 8 yrs 4mths.**

**Sound-Symbol Correspondence:** 6 not known. (Student read **c** as **s**; **e** as **i** ; **qu** as the word **up** ; **u** no response; **x** as **ek**; **i** as the letter Name **I**;

**Text Level:** 9

**Performance on Rime Unit Reading Test:** (**in** read 2 of 4 correctly; **an** read  $\frac{3}{4}$  ; **ay** read  $\frac{3}{4}$  ; **aw** read  $\frac{0}{4}$  ; **ab** read  $\frac{1}{4}$ ; **ug** read  $\frac{4}{4}$ ; **ot** read  $\frac{3}{4}$  ; **at** read  $\frac{2}{4}$  ; **ap** read  $\frac{2}{4}$  ; **op** read  $\frac{2}{4}$ ; **ip** read  $\frac{1}{4}$ ; **it** read  $\frac{2}{3}$  ; **ock** read  $\frac{1}{2}$  ; **ell** read  $\frac{0}{4}$  ; **ack** read  $\frac{1}{3}$  ; **ill** read  $\frac{2}{4}$ ; **ing** read  $\frac{0}{4}$  ; **uck** read  $\frac{1}{3}$  ; **ick** read  $\frac{1}{4}$  ; **ail** read  $\frac{0}{4}$  ; **ank** read  $\frac{2}{3}$  ; **ask** read  $\frac{1}{3}$  ; **unk** read  $\frac{1}{3}$  ; **ink** read  $\frac{2}{3}$  ; **ump** read  $\frac{2}{4}$  ; **est** read  $\frac{0}{3}$  .

To this point, 39 words were read correctly out of a possible 93.

None of the words containing the following rimes were read correctly; **ight, eat, ake, ate, ame, ice, ide, ine, ore, oke, ain, ale.**

**Additional Rimes tested:** **eg** read  $\frac{2}{3}$ ; **en** read  $\frac{1}{3}$ , **ed** read  $\frac{2}{3}$  **ig** read  $\frac{1}{3}$ ; **eck** read  $\frac{1}{3}$ ;

**Burt Word Test:** Raw Score 21.

**South Australian Spelling Test:** Raw Score 15

(Errors; gam for jam; set for sit; sow for so; ar for are  
ouf for of; dow for do; how for who; hey for here;  
spep for ship; fiy for fire; fit for thin; dat for date; sem  
for seem; dut for dart; lad for loud; fom for from.

**Sutherland Phonological Awareness Test:**

**Syllable Counting** 4/4  
**Rhyme Detection** 4/4  
**Rhyme Production** 4/4  
**Identification of Onset** 4/4  
**Identification of Final Phoneme** 4/4  
**Segmentation 1** 3/4  
**Blending** 4/4  
**Deletion of Initial Phoneme** 3/4  
**Segmentation 2** 0/4  
**Blends; Delete First Phoneme** 1/4  
**Blends: Delete Second Phoneme** 0/4  
**Non-Word Reading** 0/7 (Errors: ig read with long vowel sound for i; taf read as tay; spob...stop/spot/spop/sob ; mesk...misk; scrad ...s/c/r/at..crat; fouse ...f/o/y/s/i; ripadal...r/o/p/a/d/a/l  
**Non-Word Spelling** 3/7 (Errors : visk...vesk; strom...iom; bouse...bas; makidos...makdoos

**Student B : Age – 7 yrs. 10mths.**

**Sound Symbol Correspondence:** 6 not known ( no response for **t, k, g, qu, u, x.**)  
Also an additional sound added (uh) to the following  
**m, n, r, z, l**

**Text Level:** 9

**Rime Unit Reading Test :**( **in** read 1 of 4 correctly; **an** read ¾; **ay** read 2/4; **aw** read ¼; **Ab** read ¾; **ug** read ¾; **ot** read 2/4; **at** read ¾ ; **ap** read ¾, **op** read ¾, **ip** read 2/4, **it** read 1/3, **ock** read 2/2, **ell** read 0/4; **ack** read 2/3, **ill** read 2/4, **ing** read 0/4, **uck** read 1/3; **ick** **ail** read 0/3, **ank** read 0/3, **ask** read 0/3, **unk** read 0/3, **ink** read 0/3, **ump** read ¼, **est** read 1/3.

To this point, 38 words were read correctly out of a possible 93.

None of the words containing the following rimes read correctly; **ight, eat, ake, ate, ame, ice, ide, ine, ore, oke, ain, ale.**

**Additional Rimes Tested:** **eg** read 2/3; **en** read 1/3; **ed** read 1/3; **ig** read 2/3; **eck** read 1/3.

**Burt Word Test:** Raw Score – 21

**South Australian Spelling Test:** Raw Score 12

Ave. Score for 7yrs.10 mths.- 24

Normal range: 18- 30

Critically Low Score: 14

(Errors: pan for plan; cup for cap; mad for mud; sor for so; aea for are; ov for of; ho for who; her for here;

sip for ship; jop for chop; fod for food; fidr for fire;  
fin for thin; dat for date; sem for seem; dat for dart;  
lad for loud.

**Sutherland Phonological Awareness Test:**

**Syllable Counting** 3/4

**Rhyme Detection** 4/4

**Rhyme Production** 4/4

**Identification of Onset** 4/4

**Identification of Final Phoneme** 3/4

**Segmentation 1** 3/4

**Blending** 4/4

**Deletion of Initial Phoneme** 4/4

**Segmentation 2** 0/4

**Blends: Delete First Phoneme** 1/4

**Blends: Delete second Phoneme** 0/4

**Non-Word Reading** 2/7 (Errors: spob read as squob/stop; mesk as misk, scrad  
...s/c/r/a/d; fouse ...f/o/y s/I; ripadal...r/i/p/a/d/a/l).

**Non- Word Spelling** 3/7 (Errors: visk...viek; strom...som; bouse...bas;  
makidos...macdos)

Pre-program testing indicated both students appeared to have inadequate phonological skills, have developed faulty sound-symbol correspondences (Student A) or no sound correspondences for some letters (Student B). Word recognition was significantly below norms for their ages and text reading was marked by the lack of strategies used. With both students, if they were not able to identify a word, they would hesitate, then look at the picture to see if they could identify the context for a guess. When asked what they could do to help read a word they didn't know, both struggled to answer. Eventually Student A said she could sound it but it was not a strategy she appeared to use often. Student B could not give an answer. When sounding out words, both students retrieved sounds to match the phonemes relatively slowly, and this appeared to cause Student B, in particular, difficulty blending, when words contained more than three phonemes. Tasks requiring the students to segment words into sounds caused both students difficulty, particularly when the word contained more than three phonemes, although both appeared able to segment into onset and rime.

In regard to the choice of rimes selected to teach in the investigation, neither of the students was able to read words beyond the boundary of the **est** words on the Rime Unit Reading Test, and I elected not to include any of these as new rimes to teach. I did include five rimes that were not included in the list of the 38 dependable rimes. My reasoning was that because both students had some confusion with the e/i sounds, it might reinforce correctly decoding words containing these sounds, to increase the number of rimes which contained the sounds, and which the students had not mastered.



## *Comparison of Pre-Program Assessment and Post Program Assessment*

### **Sound –Symbol Correspondence**

By the end of lesson 4, both students were able to say the correct sound for all the letters in the alphabet. (Originally both students made errors on 6 letters, although they were errors made on different letters.) They could do this without hesitation, and were also able to maintain this performance at the end of the two-week teaching sequence. However, it became apparent that this was dependent on the symbols being presented individually, as some confusion continued when the symbols were incorporated in words.

### **Text Reading Level**

At the beginning of the investigation both students were reading at text level 9. At post testing, both successfully read one book at text level 10. I tried both students on a second book at this level, but from a different reading series, but discontinued mid-way through, as both students had made multiple errors. I make no claim that either student improved their text reading level in this time. However, given the duration of the investigation, and the persistence of reading disability for both students over time, such improvement would have been a little unlikely. As has been previously noted, both students lacked a strategic approach to reading text and needed to employ meta-cognitive strategies. I did cue the students as to what strategies they might use when they had difficulty with a word, prior to them reading books at level 10, with fairly minimal effect, and it was obvious explicit teaching and many practice opportunities until strategies had been internalized, was needed.

### **Rime Unit Reading Results**

	Student A Pre	Student A Post	Student B Pre	Student B Post
Total no. of words read Correctly	46/108	73 /108	45/108	80/108
No. of rime families read with no errors	1/31	15/31	1/31	12/31
No. of rime families read with 1 error	9/31	6/31	9/31	14/31
No. of rime families read With 2 -3 errors	16/31	4/31	14/31	3/31
No. of rime families read- 0 words correct	5/31	6/31	7/31	2/31

(The rimes referred to on this table were the first 26 on the Rime Unit Reading Test combined with the five additional rimes I taught.)

### Rimes Taught during the Investigation

	Student A Pre	Student A Post	Student B Pre	Student B Post
Total no. of words read correctly	25/53	42 /53	25/53	41/53
No. of rime families with 0 errors	1/15	8/15	2/15	6/15
No. of rime families with 0 read correctly	3/15	2/15	2/15	0/15
No. of rime families read with some errors	11/15	5/15	11/15	9/15

### Summary of Results as Percentages

	Student A Pre	Student A Post	Student B Pre	Student B Post
% of Total Words read correctly	42.59%	67.59%	41.66%	74.07%
% of Taught words read Correctly	47.17%	79.24%	47.17%	77.36%

From the above data, it can be seen that both students showed improvement over the course of the investigation, both in the total number of words read from the rime-unit families studied, and from a total which also included rimes not taught. From the rime-unit words taught, Student A read 32.07 % more words than in the pre-test; Student B had a 30.19 % increase. While the increase is pleasing, it needs to be remembered that the total number of words read was relatively small (a possible 53). In addition, errors still occurred across a significant number of rime families – for Student A in 7 of 15 families; for Student B in 9 of 15. However overall, the trend was a positive result for both students and by a similar percentage, although Student A made marginally more gains than Student B.

When a comparison is made of the results obtained from testing both rimes taught as well as some which were not taught, the percentage improvement for Student A was 25% and for Student B, 32.4%. This statistic suggests that Student B was able to generalize gains made in skill obtained from learning the words taught, to new situations, with a greater degree of accomplishment than Student A.

While both students improved their word reading on rime unit words by a similar amount, their pattern of achievement was somewhat different. Student A showed a more concentrated achievement pattern, improving from 1 rime-unit family read initially with 0 errors, to 8 rime families read with 0 errors at post-test. Student B's achievement pattern was more scattered, with improvement from 2 to 6 rime families read with 0 errors, but errors occurring across 9 rime families.

It should be mentioned that the original errors the students made, were not always with the rime segment of the word. For example, neither student knew the phonemes for the *th* letter pattern, Student A did not know the phoneme which corresponded to *ch*, and Student B did not know the phoneme corresponding to *sh*. While incidental teaching occurred when students made errors during the sessions, these errors were not addressed as the focus of any lessons, given the parameters of the study.

### Non-Word Reading; Rimes Taught

Student A	Student B
13/14	14/15

There was evidence of a continuing effect from Student A's initial faulty sound-symbol correspondences i.e. in assigning the short vowel sound for *i* to *e*. On Post Program testing, Student A decoded *test* as *t/e/st...tist*; *rest* as *rist*; *chest* as *k/i/s/t*; *ten* as *t/in...tin*; *deck* as *d/ick*, then self-corrected to *deck*; *peck* as *pick*, but no self-correction.

The original sound error appeared to be coded in memory with the orthographic representation, and while the student was now able to apply the correct sound match to the symbol when it was presented in isolation, this was not enough to over-ride the initial mismatch.

As a point of comparison, a list of non-words or pseudowords, containing the rimes taught in the investigation, was presented in the post –testing. This list contained 11 three- letter words and four four-letter words. Both students performed well on this Test, evidence of their previously noted ability to apply knowledge gained to new situations.

Interestingly, on the limited non-word reading test, of the 6 items containing a rime which included *e*, Student A correctly decoded 5 of the 6 items( 1 of the 5 included a self-correction of the vowel error).For the word decoded incorrectly, the error occurred with the final consonant.

### Burt Word Test Results

	Student A Pre	Student A Post	Student B Pre	Student B Post
Raw Scores	21	26	21	23
Equivalent Age Scores: Boys and Girls	5.11 - 6.05	6.04 - 6.10	5.11 – 6.05	6.01 – 6.07

This test was included to trace any residual effects on word reading, beyond the rime units that were the focus of the investigation. The fact that there was a positive result for both students was pleasing, given the severity of their reading disabilities. The effect was greater for Student A. An analysis of the post-test performance improvement indicated that it was made on words that could be sounded out. It was also a reversal of the inference drawn earlier, that Student B had been better able to generalize gains made.

**Sutherland Phonological Awareness Test:**

	Student A Pre	Student A Post	Student B Pre	Student B Post
Total points scored	33/58	43/58	35/58	40/58
Percentage	56.9%	74.1%	64.4%	68.9%
Percentage improvement		17.2%		4.5%

**Test Items where Changes occurred: Student A**

	Pre-Program Score	Post Program Score
8.Deletion of Initial Phoneme	3/4	4/4
9. Segmentation 2	0/4	3/4
12. Non-Word Reading	0/7	5/7
13.Non-Word Spelling	3/7	4/7

**Test Items where Changes occurred: Student B**

	Pre-Program Score	Post Program Score
5.Identification of Final Phoneme	3/4	4/4
6. Segmentation 1	3/4	4/4
9. Segmentation 2	0/4	2/4
12. Non-Word reading	2/7	4/7

During the investigation, students were taught over several days to segment words into phonemes. Student A showed a significant improvement on phonological skills improving by 17.2%. Student B also improved but by a considerably smaller margin, 4.5%. Student A’s improvement was concentrated on two sections of the assessment – Segmentation 2 and Non-Word Reading. While both students still experienced considerable difficulties with phonological tasks, Student A was able to significantly improve in comparison to Student B, whose gains were modest.

To summarize then, both students improved their performance on reading rimes taught, by similar margins, with Student A showing slightly greater percentage improvement. However on a combined assessment of both rimes taught and not taught, while both students improved, Student B showed an improvement 7.4% greater than Student A.

Both students were able to transfer learning to successfully read a list of non-words corresponding to the rimes that had been taught. These results therefore, confirm the original hypothesis, that explicit training in phonemic segmentation skills, alongside training in using rime-analogies, will result in improved reading of mono-syllabic words containing the rime units taught.

## **DISCUSSION**

As was noted in the introduction, poor phonological skills are a major contributing cause to deficient reading skills. The hypothesis investigated and confirmed that explicit training in phonemic segmentation skills, along with training in rime unit analogies, would lead to an improvement in reading mono-syllabic words containing the rime units taught.

The hypothesis tended to be more strongly confirmed by Student A, who made notable gains in both the number of words read and in phonological skills. Student B, while making similar gains on the word reading, made much less improvement in phonological skills. This indicates that for Student B, the impact onset-rime training made much more impact than the phonological skill taught, on word reading ability.

It is much more difficult to speculate on the degree of impact of each aspect of the training program for Student A. This student's results do parallel results of researchers who have noted the reciprocal relationship between phonological skill and reading progress, in that improved reading ability also leads to an improvement in phonological skill.

A possible explanation for Student B's modest improvement in phonological skills in comparison to Student A, was in the nature of the training that occurred. Children vary in the amount of instructional time required to develop phonological skills and clearly the program was too brief for this student. Only one skill was taught, phonemic segmentation, and the assessment results indicate that this was a harder skill for this student to acquire. The training period was too short for this student to master the skill. Also, teaching blending skills to this student would probably have produced gains. Although it did not show on the assessment task as a deficit, when the student decoded 4 letter words containing 4 phonemes, by identifying individual phonemes rather than segmenting into onset-rime, he struggled to read the word.

It is likely too, that this student was able to take advantage of some of the benefits of teaching onsets-rimes mentioned in the Introduction, such as the reduced memory load of shorter strings of letters and sounds, and the stability of vowel sounds in the rimes, to improve reading skills while making slight gains in phonology.

It is also possible, that Student B's improvement in reading without a significant improvement in phonological skill, may have been due to improvement in orthographic knowledge. While there is fairly uniform agreement about the major contribution of phonological awareness as a causal factor in reading disability, there is less agreement among researchers on the role of orthographic knowledge. There is agreement however

that orthography and phonology are related integrally to one another. Some researchers estimate that orthographic processing ability can account for variance in reading, independent of that accounted for by phonological processing abilities or general cognitive ability, by between 7 and 10% (Berninger, 1994).

It was not the aim of the study to investigate students' orthographic knowledge, however it seems more than likely that compartmentalizing words into the shorter onset-rime divisions, and teaching the rimes in word family groups, strengthened orthographic knowledge. Both students were able to generalize knowledge to reading non-words. This may have been as a result of improved phonological skills or improved orthographic skills or a combination of both, which seems the most likely explanation.

A further exploration of the literacy-related learning needs of the two students, would attend to the influence of rapid automatic naming speed (RAN). Bowers et al. contend that "the speed of naming simple visual symbols such as digits or letters, has a significant effect upon learning and retrieving orthographic patterns"(in Beringer, 1994). They point to the differences between reading disabled and normally reading children in the speed of reading words, even when reading practice is constant across groups, and the commonly reported finding that reading disabled and normally achieving children differ on the speed of naming simple digits, a task which does not involve phonemic sensitivity. Anecdotal evidence was that the students were somewhat slow in processing and this factor may have been an influence on the words they failed to learn.

Another area that would benefit both students is the explicit teaching of meta-cognitive strategies. It was observed in initial testing that both students lacked a strategic approach to text reading. However, both were able to generalize gains made to reading simple non-words, and this is some evidence of an analytic approach. The generalized gains were made in reading isolated words and whether the students would transfer this gain to further text reading without further coaching, is debatable.

The evidence from this investigation was in contrast to the findings of the 1997 study by Greaney et al., who found that the reading disabled students in the study failed to make use of onset-rime knowledge gained, to read unfamiliar words. The students in this study performed well on a non-word reading test and also improved in their ability to read words, which had not been taught directly. This contrasting finding could well have been the result of the fact that this study only included two children and it is impossible to extrapolate general trends from such a small sample. The findings did mirror Greaney et al.'s, in that improvement generalized to performance on a standardized reading test (the Burt Word Test).

In conclusion, the investigation provided documented benefits for the two students involved and confirmed the hypothesis proposed. It also highlighted the complexity of causal factors in reading disability and their inter-relationship. Doubtlessly the two students concerned would benefit from any further exploration of factors, which contribute to reading disability.

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## APPENDIX – TEACHING UNIT

### Phonemic Segmentation Component

Aims: \* to improve mono-syllabic word reading skills by improving phonological/ phonemic skills  
\*to enable the student to use phonemic segmentation when reading text  
\*to encourage gains in self-efficacy by improved performance outcomes

Procedure:

1. Teacher describes how words can be broken up into their component parts/letters using magnetic letters and joined again by blending both sounds and the orthographic representation.
2. Teacher demonstrates different way of breaking words up. E.g. The word *fun* is used in the demonstration. One counter is selected for each phoneme in the word and placed in a line. Each counter is then tapped and the individual phoneme it represents, voiced. The children count the number of sounds involved.
3. Segmentation is again demonstrated as before.
4. The children practice the skill, either simultaneously or in turn.

Initially, only words with two or three phonemes are used.

If the children are having difficulty hearing the sounds involved, the teacher says she will “ stretch “ the word out, to assist. She then makes a stretching motion with her hands, while exaggerating the articulation of the word so that each component sound may be more easily identified.

Once the students are able to do this activity with a reasonable amount of ease, the teacher demonstrates how to extend the activity by using letters. Instead of using counters, the teacher writes a dash for each phoneme isolated, on the white board. She then isolates the phonemes again verbally and writes in the appropriate grapheme on the dash, as she moves through the structure of the word. The students then practice the skill.

### Teaching Sound-Symbol Correspondence

Aim: to improve letter-sound knowledge and so improve decoding skill and the speed with which it occurs

Procedure:

1. Practice matching pictures with the symbol of the corresponding initial sound of the word.
2. Bingo Games in which the letter correspondences the students have yet to master, are featured.
3. Sound Dictation. Teacher dictates sound. Students write it on whiteboard.



## Teaching the New Rime Unit

### Procedure:

1. The sound and orthographic representation are introduced in a cue word. e.g. for **ap**, cap is the cue word.
2. Children suggest any other words, which may contain the rime and come out to write them on the whiteboard.
3. Children then read **ap** words from a word family chart, in which the **ap** component of the word is written in a different colour. Children are encouraged to identify the onset and rime components separately first and then the blended word.
4. As a group, students read and complete rhyming activity which corresponds to the rime being studied. Students have access to the word family chart for this activity if need be.  
e.g. *On Tim's lap*  
*The cat had a ... ( nap)*  
  
*I can see the map.*  
*It is on John's...( lap)*
5. Children may produce own rhymes for the rime being studied.
6. Reinforcement activity- select one from the list below.

### Reinforcement activity

A) Snap/Fish

Or

B) Noughts and Crosses with the words being studied written in the spaces and the student unable to put their symbol in until they have correctly read the word.

Or

C) Beat My Score Game. Teacher turns target words on flash cards over for students to read rapidly within the space of a minute. The aim is to beat the same student's previous score.

D) Activity Sheet – see Appendix 2.

## Structure of Teaching Cycle

These lessons are designed for year 2 students experiencing reading difficulty . Lessons are planned to occur in a small group. Repetition of target words occurs regularly to minimize memory difficulties. One of the activities – Beat My Score, is designed to improve speed of word recognition. The program also makes use of analogy training by introducing multiple words containing the rime being taught, on a word chart. This program primarily addresses difficulties occurring at the word level, but it does extend practice opportunities to reading text towards the end of the program. At the end of lessons students are asked to articulate what they have learned, thereby contributing to meta-cognitive skills and increasing self-efficacy.

- Lesson 1: Sound-Symbol Correspondence Activity- Part 1  
Phonemic Segmentation Component.  
Introduce rime **ap** as described in procedure.  
Activity Sheet 1-see Appendix 2  
Review learning.
- Lesson 2: Sound –Symbol Correspondence Activity- Parts 1 & 3  
Phonemic Segmentation Component.  
Review previous rime unit taught. Introduce new rimes-**eg & ip**.  
Snap.  
Review Learning.
- Lessons 3 & 4: Sound- Symbol Correspondence Activity- Parts 1,2 & 3.  
Phonemic Segmentation Component  
Review Rimes taught previous lesson. Introduce new rimes-  
**ab, eck, op, ed**  
Noughts & Crosses. Beat My Score.  
Review Learning.
- Lessons 5 & 6: Phonemic Segmentation Component. Extend to Letter Link.  
Review Rimes taught previous lesson. Introduce new rimes –  
**In, ick, / en, est**  
Snap. Activity Sheet 2. - See Appendix 2.  
Review Learning.
- Lessons 7 & 8. Phonemic Segmentation Component. Extend to Letter Link  
Extend to 4 Phoneme Words.  
Review Rimes taught previous lesson. Introduce new rimes –  
**ell, it**  
Beat My Score. Fish  
Review Learning
- Lessons 9 & 10: Phonemic Segmentation Component. Extend to letter link.  
Extend to 4 phoneme words.  
Text reading containing rimes previously introduced and studied.  
(taken from “Rhyme Your Way to Way to Reading Writing and  
Spelling: Lyn Traill. Book 1. Oxford University Press. p5 & p 17)  
After reading text as a group, pick out rhyming words and list.  
Have children circle the particular rime units.  
Review learning.

**Appendix 2**  
**Activity Sheet 1**

**Circle the words, which have the ap pattern.**  
**Write the words.**

lap mat hip gap flap rag

**Circle the words, which have the ig pattern.**  
**Write the words.**

dog pig leg wig jig fin rag big skid

**Circle the words, which have the in pattern.**  
**Write the words.**

thin bin men tin pig fan grin hill thin

**Activity Sheet 2**

Circle the odd one out

lick	fan	best
sick	ten	rest
neck	men	nest
kick	den	lost
thick	pen	pest
pin	mop	cab
fin	hop	web
thin	grab	lab
win	stop	stab
ran	pop	grab

STUDENT A

The family pet is a cat called Sam.

He can be a pest.

-

He bashes at spider webs

on the sun deck.

pick his  
The hens peck him on the neck.

Once he fell into a well.

He got very wet.

He won't let anyone pat him.

Dad thinks he's a pest.

Mek  
Mum and Meg think he's a pest.

Dip  
Deb and Jen think he's the best.

The vet thinks he's the best.

I think he's the best too.

**STUDENT B**

The family pet is a cat called Sam.

He can be a pest.

- spiders  
He bashes at spider webs

on the sun deck.

The hens peck him on the neck.

Once he fell into a well.

He got very wet.

want -  
He won't let anyone pat him.

Dad thinks he's a pest.

best  
Mum and Meg think he's a pest.

Deb and Jen think he's the best.

vest  
The vet thinks he's the best.

I think he's the best too.

The family pet is a cat called Sam.

He can be a pest.

He bashes at spider webs

on the sun deck.

The hens peck him on the neck.

Once he fell into a well.

He got very wet.

He won't let anyone pat him.

Dad thinks he's a pest.

Mum and Meg think he's a pest.

Deb and Jen think he's the best.

The vet thinks he's the best.

I think he's the best too.

**STUDENT A**  
**THE HOUSE ON THE HILL**

-  
The House on the Hill  
why

-  
One day the white sheep said,

“My house is very old.

no  
on  
It is no good.

I will get some wood

nice  
and make a new house

up on the hill.

help  
- h/i/l/p  
But who will help me ?”

“ I can help,” said

the grey rabbit.

“ No you can’t,”

said the white sheep.

“You are too little.”

“I’m not too little,”

said the grey rabbit.

“I can dig the holes

for the house.”

“I can help,” you

-  
said the brown duck.

“No you can’t,”

said the white sheep.

“You are too little.”

“I’m not too little,”

said the brown duck.

“I can get some mud wood

-T  
for the walls.”

“I can help,” you

said the red hen.

“No you can’t,”

said the white sheep.



“You are too little.”

“I’m not too little,”  
hen  
duck  
said the red hen.

-  
“I can fly up  
roof  
rr  
and make the roof.”

The grey rabbit dug the holes.

The white sheep made the walls.

The brown duck got the mud.

The red hen made the roof.

“We have made  
that  
a very good house,” they said.

“Yes,” said the sheep.  
Thank you  
Thankyou your  
Th a/n/k  
“Thank you for helping me.”

Then they all went inside  
nice  
the new house on the hill.

**STUDENT B**  
**THE HOUSE ON THE HILL**

The House on the Hill

-  
One day the white sheep said,

“My house is very old.

It is no good.

Some

so

I will get some wood

and make a new house

up on the hill.

-

why

will

But who will help me ?”

“ I can help,” said

gr

-

the grey rabbit.

“ No you can’t,”

said the white sheep.

“You are too little.”

“I’m not too little,”

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“I can fly up  
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the  
back to  
and make the roof.”

dig the house  
The grey rabbit dug the holes.

-  
The white sheep made the walls  
mud  
the H H mud  
to  
The brown duck got the mud.

The red hen made the roof.

“We have made

a very good house,” they said.

“Yes,” said the sheep.

Th/ a/n/k  
That  
“Thank you for helping me.”  
H  
Then they all went inside

the new house on the hill.

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