

Explicit teaching in phonological knowledge and segmenting and blending into onset and rime using words in context improves word reading accuracy for grade 1 at risk readers.

Abstract

The ability to read words automatically and accurately continues to be a challenge for many at risk grade 1 readers. Limited opportunities to develop strong foundations in phonological and orthographic knowledge that are critical for efficient word reading, impacts on the development of reading accuracy, fluency and most importantly comprehension. Some research suggests that onset-rime instruction has the most significant influence on word reading achievement. However there is a growing consensus amongst the research that literacy instruction is most effective when it enables students to integrate all areas of knowledge ie; phonological, orthographic and oral language within the context of the reading process.

This study examined the effectiveness of explicitly teaching phonological awareness and segmenting and blending onset-rime words, within the reading context, on word reading accuracy for grade 1 at risk readers.

Three grade 1 students who were underperforming on all school based reading tasks were withdrawn for ten, 45 minute lessons over a five week period. Lessons focused on enhancing students' ability to automatise their reading of one syllable words by segmenting and blending the onset and rime, through phonological, orthographic and oral language based tasks. A control group of matched age and reading abilities was chosen for comparison.

Post-test results showed that the intervention group outperformed the control group on measures of phonological knowledge, word reading accuracy and reading comprehension. Surprising outcomes, according to monitoring data, were that all students in the intervention group also improved in their ability to reflect on their learning. These findings support the hypothesis and have direct implications for current teaching practice with early years struggling readers.

Introduction

For many beginning readers making connections between the written and spoken word is a difficult process. Recoding letter clusters as sound patterns and blending these sounds into words automatically can be a very difficult process for many early years students. So much energy is invested in inefficient word reading strategies ie; at this “decoding phase” that accuracy, fluency and hence comprehension are all compromised. In her model of skilled reading Adams (1990) describes decoding as the connection of letters (orthographic information) with the sounds (phonological information) to form words. Learning to decode well and develop efficient word reading accuracy in the early phases is essential to successful reading outcomes (Ehri, 2005; Tunmer & Chapman, 2002).

In order for students to develop efficient word recognition skills, they must first have acquired a knowledge of sounds and sound patterns or phonological knowledge (Munro, 1998; Stahl & McKenna, 2000). It is widely supported in the research that phonological and phonemic awareness, which are key aspects of phonological knowledge, are necessary for reading proficiency. Munro (1998) found that early literacy learners’ development of phonological awareness not only impacts on their ability to read isolated words but also their ability to comprehend and read prose fluently. Love and Reilly (1998) emphasize that phonological awareness is not only a powerful predictor of reading outcomes but that it can be taught. Explicit teaching in phonological and phonemic awareness skills such as blending and segmenting spoken words into sounds and or grouping words with shared rhyming or alliterative patterns has been shown to positively influence the development of early literacy skills (Ryder, Tunmer, & Greaney, 2008).

While there is considerable evidence that there is a link between phonological knowledge and success in reading, Bus and van IJzendoorn (1999) and Hulme, Snowling, Caravolas & Carroll (2005) argue that phonological awareness is only one causal factor in learning to read. They contend that reading training programs focusing on phoneme awareness skills alone would have limited impact. Teaching which incorporates skill development in phoneme awareness, letter knowledge and letter/sound links with in the context of the written word is a far more effective approach. Stahl and Murray (1994) and Stahl and McKenna (2000) found that Phonological awareness skills such as the segmentation and blending of onset and rime within syllables is strongly correlated to word reading accuracy. They also claim that attainment of concurrent phonological and orthographic knowledge is necessary to have a positive impact on word recognition. Serry et al, (2008) in their review of oral language predictors for at-risk readers, found strong evidence for the importance phonological processing as a pre-requisite skill for reading. As well as phonological awareness, rapid

automatic naming and phonological memory were two other key phonological processing variables that contribute to successful reading outcomes.

Efficient word reading skills allows students to read fluently and accurately. Weaknesses in rapid automatic naming or RAN, which is the ability to name letters and letter clusters quickly has recently been shown to have a strong correlation to reading achievement (Catts, Gillespie, Leonard, Kail & Miller, 2002). In order to recognize words and letter patterns automatically and accurately, beginning readers need to opportunities to develop their orthographic knowledge and phonemic awareness or phonemic decoding. (Munro (1998) This enables students to form analogies between known and unfamiliar words more efficiently and rapidly. There is evidence to show that students who are reading words in an automatic rather than attention demanding way are able to free up their working memory and allow them to focus more on meaning (Adams, 1990; Juel & Minden-Cupp, 1999).

As mentioned previously, accurate word reading requires the effective use of phonological and orthographic knowledge concurrently. There is a converging body of evidence that even poor readers can benefit from a “hands on” approach involving both phonological and orthographic activities that involve segmenting and blending the onset-rime unit (Adams, 1990; Juel & Minden-Cupp, 1999; Moustafa, 2000). Research has found that the ability to detect the onset and rime with in the spoken word as one of the earliest phonologically based skills (Love and Reilly, 1998; Moustafa, 1995; Cassady and Smith, 2004). Goswami & Mead (1992) concluded that there was a specific connection between the awareness of the spoken rime unit and the ability to make connections between the letter clusters that make up the rime patterns in written words. Students were more likely to make analogies to read new words or pseudo words if they were taught spelling patterns at the onset-rime level rather at the initial sound level. Moustafa (1995) found onset-rime analogy a much more efficient word reading strategy than phonemic recoding blending. Rime unit teaching has been found to be much more effective when phoneme/grapheme knowledge has been consolidated first or integrated within the program (Stahl & Murray, 1994; Bus and van IJzendoorn, 1999). Even prompting readers to attend to the orthographic and phonological features of the rime unit within the word was found to be a more effective cueing system than simply giving the student whole word prompts (Moseley & Poole, 2001).

Accurate word reading requires a range of additional abilities and knowledge. As well as developing phonological and orthographic knowledge, how the word is said and used, its’ meaning and syntactical relationship with other words within the sentence, hence oral language abilities, are all crucial skills in the developmental sequence of learning to

read words. According to current research evidence, oral language competence is a very important variable impacting on improved literacy outcomes. CECV (2011) The researchers found that by building the capacity of teachers to effectively scaffold students' oral language related to their learning and explicitly teach the underlying oral language knowledge within the literacy task, all students achieved measurable gains in reading comprehension as well as oral language. Key oral language skills that were explicitly taught within the context of the literacy task included phonological and phonemic awareness, receptive vocabulary, story grammar and comprehension and use of longer sentences. One of the models of effective teaching used within the Oral Language Supporting Early Literacy project (CECV, 2011) was developed by Collins, Brown and Newman (1998 cited in Munro, 2011). They ascertain that a key component of effective intervention for students with language difficulties is facilitating the student's articulation and reflection of the learning process.

Learning to read words depends on a broader range of language based skills. The context of the word within a phrase, sentence and at text level must be considered in the planning of any effective reading program (Moustafa, 1995; Hulme et al, 2005). Decontextualising reading instruction by simply teaching segmenting and blending onset-rime in isolation may produce students who can blend onset and rime in reading words but with limited knowledge of how to use this skill to develop their reading further (Cassady & Smith, 2004).

The present investigation aims to extend the earlier research by examining the influence of teaching letter clusters or rime units in one syllable words through development of the student's phonological and orthographic knowledge. Key aspects of this teaching includes segmenting and blending the onset and rime, automatically recoding letter cluster patterns using words in context and encouraging the students to use their oral language skills by articulating and reflecting on their knowledge of efficient word reading strategies.

Hypothesis

Explicit teaching in phonological knowledge and segmenting and blending into onset and rime using words in context improves word reading accuracy for grade 1 at risk readers.

Method

Design

The study uses a naturalistic, case study OXO (ATA – Assess Teach Assess) design in the context of a “real” classroom. Gains made in monosyllabic word reading accuracy following explicit phonological and orthographic rime-unit instruction for monosyllabic words in context is monitored for grade one students who have reading difficulties. The study compares two groups of students, an intervention and a control group.

Participants

The participants are 6 Grade One students, with ages ranging from 6.8 – 7.4 years. Students attend the same Catholic Primary School and have a history of reading difficulties. Students were selected based on their running records and observation survey testing, which took place at the commencement of their current school year. All students were assessed as reading below benchmark ie; text level 5 and scores on all other testing were well below that expected at end of the Prep year. Additional reading comprehension PAT-R (Performance Achievement Test – Reading) testing in June this year indicated that all students were performing below the 10th percentile for their grade level. Relevant student data is shown in table 1. All students had developed phonological and orthographic knowledge at the single sound/letter level as reflected in their performance on the Observation Survey letter/sound identification test.

Table 1

Name	Control = 0 Teaching=1	Age in MONTHS	Gender 0=Male 1= Female	Years of Schooling	ESL No=0 Yes=1	LNSLN funding 0=SLD 1=ID 2=Asp	Earlier Intevention No=0 RR=1 Bridges=2 ERIK=3...	Ob Survey / Letter ID	EMA No=0 Yes=1
A	1	89	1	2	0		0	54	0
B	1	83	0	2	0		0	54	0
C	1	83	0	2	0		0	54	1
D	0	83	1	2	0		0	54	0
E	0	88	1	2	0		0	54	0
F	0	80	0	2	0		0	54	1

It was observed during individual word and prose reading tasks most students;

- Read words using distinctive visual features, usually the first letter only.
- Attempted to read words using letter by letter recoding but couldn't blend them accurately to form words.
- Were unable to recognise many of the common letter clusters or rimes when reading individual words.
- Had difficulty phonologically segmenting and blending rapidly
- Had difficulty using orthographic similarity between words to read less familiar words (analogy)

Materials

The materials used include the following;

Pre & post testing:

Phonological knowledge was assessed using the Sutherland Phonological Awareness Test-Revised (Neilson, 2003). Phonological knowledge is tested at the levels of syllable, onset-rime and phoneme (CVC and consonant clusters).

Word Reading tasks: Students were initially tested using John Munro's Orthographic Reading test however 5 of the 6 students could read less than 3 words accurately and exhibited frustration.

The rime unit test (Dalheim, 2004) was used to obtain a raw score of the number of words read correctly in a 5 minute period. This test measures the student's ability to integrate simple letter cluster-sound patterns. This test contains 1-syllable words that vary on two levels of complexity; the number of letters and how the letters map into sounds. The original test format needed to be modified to a 5 minute time period because during trial testing some students were taking over 20 minutes to complete the test and becoming quite upset.

Prose reading aloud tasks:

Reading aloud was assessed using 2 assessment batteries;

a)The Neale Analysis of Reading Ability-3rd Edition (1999) provides standardised data for reading accuracy, comprehension and rate.

Given that all students were only able to complete one reading passage on this test and scored a reading age below 6 years during pre-testing it was decided that additional testing of prose reading was required. As this is a blunt assessment tool its' ability to measure change in the student's reading performance over such a brief time period is significantly diminished.

b) Progressive Achievement Tests in Reading (PAT-R) revised-4th Edition, Reading Comprehension Test (ACER) is a standardised test for tracking student progress in reading comprehension.

Students were tested by the teacher one month prior to commencement of this study, hence these scores were used to compare with post-test scores as a measure of reading comprehension achievement.

Rapid automatic naming skills were assessed using the RAN sub-test from the Clinical Evaluation of Language Fundamentals-4 (Semel.E et al, 2006). This test was chosen as a measure of verbal automaticity which provides criterion referenced data and is more useful for interpreting the student's performance on naming accuracy and rate.

Pre and post-test data analysis:

Raw scores, scaled scores and percentile rankings, where possible, were calculated for each student on each pre & post test used in this study. (Table 3)

The pre and post-test means and standard deviations for both the teaching and the control group were then calculated. (Table 2) The differences between the mean scores were then analysed to:

- Determine whether the data supports or refutes the study's hypothesis.
- Identify areas of development that the teaching methodology had the greatest impact on.

Each of the teaching group student's pre and post-test measures were graphed. (Figures 1-6) Individual differences in their outcomes on each test measure was compared and analysed. Independent variables such as poor attention and self-efficacy, which might influence the reading outcomes, were also considered in the analysis.

Ongoing monitoring:

Reading automaticity of one-syllable, onset-rime words was measured each lesson for each student. The student's rate of reading each sequence of 10 onsets plus one rime to form 10 real or pseudo words was measured and scored. (Figure 7; Appendix 6, table 4)

Rate of reading 3 separate onsets in combination with 4 previously taught rimes to form 12 real or pseudo words was also recorded at 3 weekly intervals. (Figures 8-10; Appendix 6, table 4)

Student reflections; Student's ability to articulate their understanding of the value of segmenting and blending, identifying the onset & rime in words and explaining the odd one out rhyming task was recorded at 3 weekly intervals (Appendix 6, table 5).

Teaching:

- Ten grade 1-2 stories from the Enhancing Reading Intervention for at risk students program (ERIK; University of Melbourne and Catholic Education Office Melbourne). These stories were selected as each story has a simple story grammar sequence, the text contains a high portion of words that feature 2 target rime units as well as onset-rime units that have already been taught orthographically and phonologically. The stories are also short ie; between 124-154 words and have a readability at a grade 1 level according to Fry's readability graph. (See list of ERIK stories in appendix 2)
- White board and markers
- Highlighter pen
- Reading rods, word building reading kit grades 1+ (Learning Resources)
- Timing and recording device eg; iPhone.
- Onset-rime word cards (real & pseudowords; see appendix 4)
- Odd one out rhyming pictures (see appendix 5)

Procedure

Initially students were randomly allocated to either the intervention or the control group. Intervention students were withdrawn from their classrooms and were given 10 x 45 minute small group lessons, taught over 5 weeks. Lessons were conducted in the afternoon, so that the students did not miss their morning literacy/numeracy block.

Sequence of lessons:

Week 1: Pre-test data collection

Weeks 2 - 6: Lessons 1-10

Week 7: Post-test data collection

- ❖ Reading rate for onset-rime blending tasks recorded and tabled each lesson.
- ❖ How words were read during onset-rime blending task recorded and tabled lessons 3, 6 & 9.
- ❖ Student reflections recorded and analysed lessons 1, 4, 7, 10. These lessons were audiotaped to monitor the oral language used in their reflections of the learning.

The teaching design for the lessons was based on aspects of "A sequence for teaching letter cluster-sound links needed for reading". (Munro, 2011)

This design was selected to determine whether improving students' ability to automatically phonologically and orthographically segment and blend words based on onset and rime in context and reflect on the knowledge gained will improve word reading accuracy.

The teaching tasks were administered to all students in the following order; Greater details of each teaching session outlining both the teacher and student activities is shown in Appendix 1.

1. Introduction of 2 new rime units. (see teaching sequence of rime units in appendix 6, table 4). The 20 rime units selected are all simple, VC & VCC combinations containing short vowels only. Many are dependable, secure rimes, which occur more frequently in text.
2. Prose reading (loaded with target rimes) by teacher.
3. Phonological and phonemic awareness tasks: Rhyme awareness (selecting the odd one out), rhyme generation, segmenting and blending onset & rime in spoken words.
4. Oral Language tasks; Saying words accurately and putting difficult words into a meaningful sentence. Discussing the shared sound patterns in onset and rime words. Reflecting on the knowledge gained.
5. Orthographic tasks; a) writing 2 lists of real onset-rime words
b) work on letter cluster-sound links through segmenting and blending real and pseudo (written) words with the 2 target rimes
6. Work on rapid naming of letter cluster-sound links through timed blending of 3 onsets and 4 previously taught rimes into real or pseudo words.
7. Prose reading (loaded with target rimes) by students.
8. Students retell story to each other.
9. Reflection and exploration through student discussion of learning.

Data Collection – ongoing monitoring

1. Reading automaticity (rate)
Each lesson, the changes in students' ability to automatically read target onset-rime real and pseudo words was recorded as the time taken to blend 10 separate onsets with 1 target rime unit. 2 separate times were recorded for each separate target rime. For the first 3 lessons students blended single consonant onsets with the target rime ie; C+VC, from lessons 4-10, 2 consonant blend onsets ie; CC+VC, were randomly introduced.
The ability to rapidly read across rime units was also timed in sessions 2-10. The students were required to blend 3 separate onsets with 4 previously taught rimes to read a total of 12 real or pseudo words. In addition to rate, data was also collected in weeks 3,6 & 9 to determine how each word was read and gain insight into the types of words the students were having the most difficulty with.

How each word was read was classified according to the following key:

CR = Correct and rapid
CS = Correct and slow
COR = Correct after segmenting into onset-rime
CLL = Correct after letter by letter recoding
SC = self corrected
IC = incorrect

Results of students' changes in reading rate and how each word was read is shown in Appendix 6, table 4 and graphed in figures 7-10.

2. Student reflections on the learning:

Changes in the students' ability to articulate their understanding of the value of segmenting and blending, identifying the onset & rime in words and explaining the odd one out was recorded at 3 weekly intervals. The teacher then made a subjective evaluation of their responses to the following 2 questions:

Why did you pick that one as the "odd one out?" (OOO)

A = Accurate eg; "rack" doesn't go with map or trap because it doesn't end in "ap"

V = Vague (relied on listener to interpret) eg; "rack" doesn't go with map or trap because it's different.

I = Inaccurate eg; "rack" doesn't go with map or trap because it's got "at" at the end.

DK = Don't know

What do you know now that will help you to read words? (Self-reflection = SR)

A = Accurate eg; Now I can read "map", I can read other words like "gap, tap or flap" because they have the same sound patterns at the end.

V = Vague (relied on listener to interpret) eg; I can read words that rhyme sometimes.

I = Inaccurate eg; "I like reading these words"

DK = Don't know

These results are recorded in appendix 7, table 5.

Results

Results indicate support for the hypothesis that explicitly teaching grade 1 at-risk readers phonological knowledge and segmenting and blending into onset and rime using words in context improves word reading accuracy. The pre and post-test means and standard deviations or the spread of scores for both the teaching and the control groups on all measures are shown in Table 2. Although both groups made gains, the teaching group outperformed the control group at post testing on all measures.

Comparison of pre and post-test means for the SPAT measures indicates a greater trend of improvement for the teaching group. Despite a considerable variance in post-test scores on the SPAT test of phonological knowledge it was observed that most of the teaching group students improved in their ability to segment and manipulate sounds in words as well as spell and read non-words. One student even commented; “that’s bouse like in house” demonstrating use of rhyming analogy as a word reading strategy.

There was little difference between the two groups’ pre and post-test means on the Rapid Automatic Naming test (RAN). The teaching group students’ pre-test performance was much better than the control students. All teaching group students performed in the average range for their age, hence marked improvement for these students was not expected. Developing RAN had an impact on all students’ ability to accurately and automatically read simple monosyllabic words however the teaching group again showed the greatest gains on the rime unit test. The teaching group also displayed the greatest spread of scores on the Rime test. Table 4 displays a marked variation in scores for teaching students B and C suggesting that faster RAN skills might influence word reading accuracy. It was clearly obvious during the Rime Unit post-testing that the teaching group were reading words more automatically or segmenting words into onset and rime before blending to form words. The control group, on the other hand, more frequently relied on letter by letter recoding and blending to read words.

Table 2: pre & post-test means and standard deviations for the control and teaching groups on all measures.

Test measures	Teaching group (N=3)				Control group (N=3)			
	Pre-test		Post -test		Pre-test		Post-test	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age (mths)	84.67				83.67			
SPAT	31.33	2.08	40.33	7.77	35.67	2.31	37.00	1.00
RAN	95	16.46	93.33	11.72	110.33	51.89	107.90	50.15
Rime Unit Test	21.67	7.57	43.33	21.22	23.67	1.15	29	1.15

Neale Accuracy (raw score)	8.67	4.04	15.00	4.36	6.67	3.21	9.67	0.58
Neale Comprehension (raw score)	2.67	1.53	7.00	2.65	2.33	1.15	2.00	1.00
PAT-R (Comprehension – scaled score)	60.0	2.86	81.87	6.79	61.60	12.68	63.67	15.71

Despite obvious gains made in the pre and post testing score comparisons for both groups on the Neale Analysis of Reading (Neale) test measures, these results should be viewed with caution. The sensitivity of the Neale test to rigorously measure such small gains over a short period of time is questionable. Given this information it is worth noting that four of the six students in the study were only able to successfully complete the first story of the Neale in both pre and post testing. Two of the teaching group students were able to progress and answer questions relating to the second story, demonstrating improved word reading automaticity and ability to derive meaning from the text.

Possibly the most significant outcome in the data is the comparison of the pre and post-test means on the PAT-R measures for both groups. The PAT-R provides a scaled or standardised score as a measure of reading comprehension. The scaled score provides a more accurate measure of a student's ability and allows teachers to compare different test scores to track student's reading growth along a continuum. The PAT-R mean scaled score for Grade one students, on the test booklet provided, is 92.6. This indicates that although both groups were still below the average for their grade level on post testing, the teaching group made a greater improvement ie; 21.87 scaled scores compared to the control group's 2.07 scaled scores. This suggests that there was a tendency for the positive effects of the intervention program to generalise to reading comprehension, which is consistent with the well-established relationship between the development of word recognition skills and reading comprehension ability. (Adams, 1990)

Individual results for all students in the study, across all test measures, are displayed in tables 3 & 4. These individual and group trends suggest that the teaching program was successful in supporting its' primary hypothesis of improving word reading accuracy given explicit teaching of phonological and orthographic knowledge in segmenting and blending onset and rime.

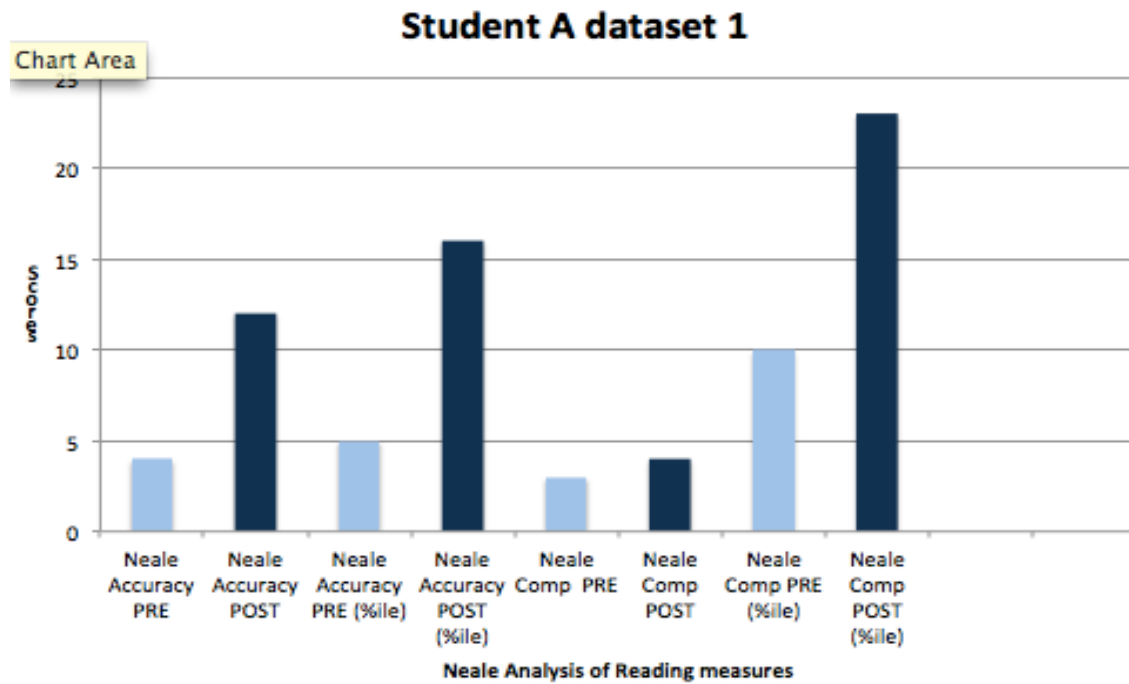
Table 3

Name	Control = 0 Teaching=1	Age in MONTHS	Gender 0=Male 1= Female	Years of Schooling	Attendance No. of sessions	Neale Accura cy PRE	Neale Accura cy POST	Neale Accuracy PRE (%ile)	Neale Accura cy POST (%ile)	Neale Comp PRE	Neale Comp POST	Neale Comp PRE %ile	Neale Comp POST %ile
A	1	88	1	2 years	9	4	12	5	16	3	4	10	23
B	1	83	0	2 years	9	11	13	16	17	4	8	19	40
C	1	83	0	2 years	10	11	20	16	40	1	9	1	47
D	0	83	1	2 years	0	8	10	11	11	3	1	10	2
E	0	88	1	2 years	0	3	10	4	11	1	3	2	10
F	0	80	0	2 years	0	9	9	14	10	3	2	10	3

Table 4

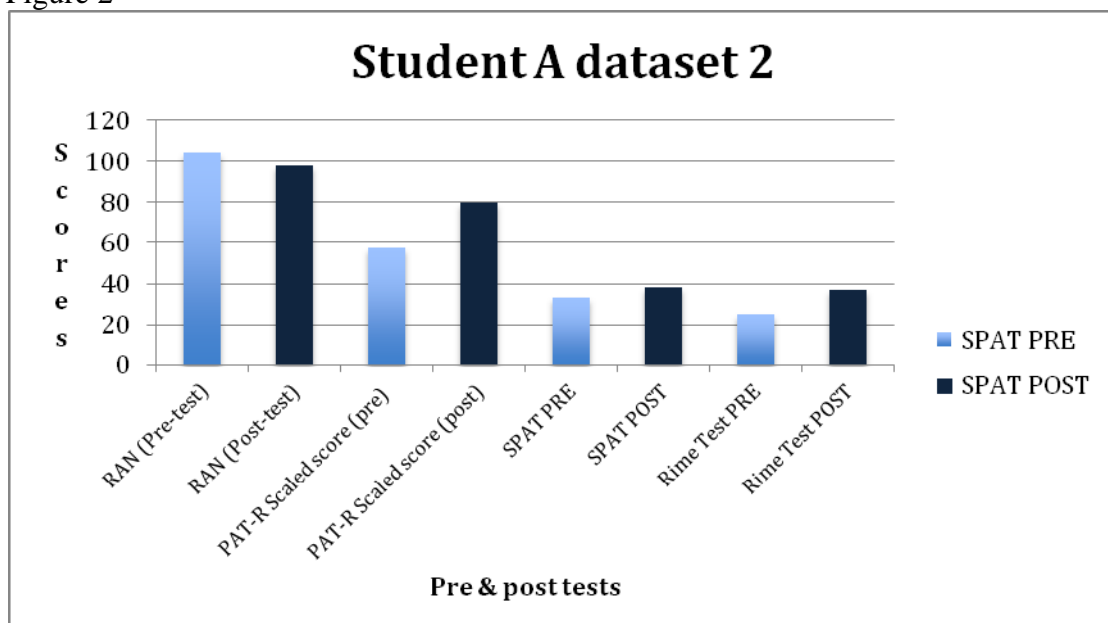
Name	Control = 0 Teaching=1	Age in MONTHS	Gender 0=Male 1= Female	PAT-R Scaled score (pre)	PAT-R Scaled score (post)	SPAT PRE	SPAT POST	Rime Test PRE	Rime Test POST	RAN PRE Time	RAN POST time
A	1	88	1	57.7	79.6	33	38	25	37	104	98
B	1	83	0	63.2	76.5	29	34	13	26	105	102
C	1	83	0	59.1	85.9	32	49	27	67	76	80
D	0	83	1	48.2	48.2	37	38	23	24	165	158
E	0	88	1	57.7	79.6	33	37	25	32	104	124
F	0	80	0	73.4	63.2	37	36	23	31	62	57.7

Figure 1



Student A (Figures 1 & 2) demonstrated variable improvement on all test measures. Her gains from the 5th to the 16th percentile for her grade level on word reading accuracy and then from the 3rd to the 23rd on comprehension is very encouraging but as discussed previously should be viewed with caution. While student A's word reading accuracy on the rime test and Neale improved there was an obvious flow on effect to gains in reading comprehension as indicated by the increase of 21.9 scaled scores on PAT-R testing. Student A, who is not a confident reader, participated enthusiastically in the teaching sessions. She appeared to value the knowledge gained and its' impact on reading comprehension as her story retells were longer and more complex as the lessons progressed.

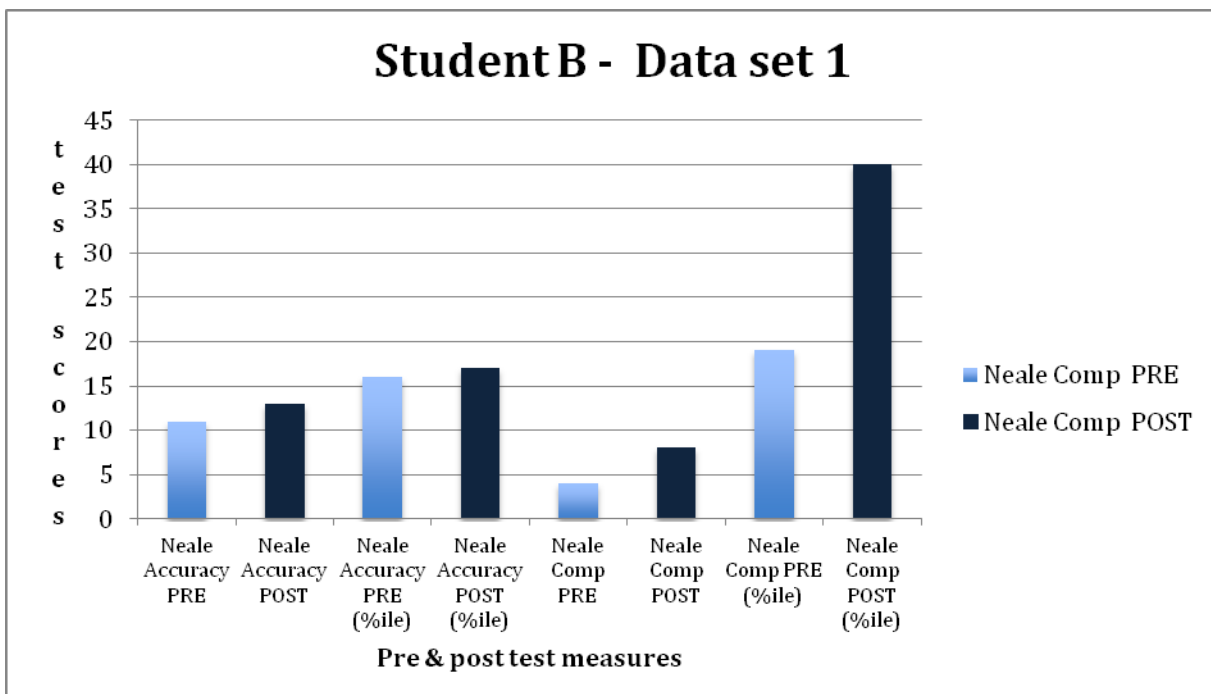
Figure 2



Closer observation of student A’s monitoring data (figures 7 & 8) indicates a general trend of improvement in her ability to accurately and automatically blend onset and rimes. Student A frequently confused the short vowels within the VC or VCC rime unit while blending onset and rime to form words; for example, am/um, ill/ell. These vowel confusions had a significant impact on rate as exemplified by the increase in times during lesson 4 and 6. While student A was able to read more words correctly and rapidly she was also able to articulate and reflect more accurately on her learning by the final lesson. She self-corrected her “odd one out” response by reflecting that “*chess* can’t go with *chest* and *nest*” because it hasn’t got the same rhyming sounds at the end.”

Compared with the other two teaching group students, Student B’s reading performance fluctuated the most across the ten lessons. (Figures 7 and 9) This is possibly due to student B’s varying level of attention and engagement across the lessons. Figure 3 displays a general trend of improvement for student B across all measures on the Neale Analysis of Reading. Despite a very small gain in student B’s word reading accuracy ie increase from the 16th to the 17th percentile for his grade level, there appears to be greater gains in reading his comprehension skills ie; an increase from the 19th to the 40th percentile.

Figure 3



Again the small improvement in reading comprehension raw scores from 4 to 8 must be viewed with caution however this improvement is consistent with the gains in Student B’s scaled scores on the PAT-R test. (Figure 4). Compared with his pre-test performance on the rime unit test student B was able to read more words correctly

and automatically. The examiner noted some improvements in his ability to segment and blend words into onset and rime however he still relies heavily on “guessing words” according to distinctive visual features or letter by letter recoding to read lower frequency monosyllabic words containing 4 or more letters. Student B made the least improvements in his phonological awareness on post-testing. He obtained scores of 2/4 on the sound segmentation and deletion subtests. Although these scores are better than the 0/4 obtained on pre-testing these skills are by no means consolidated

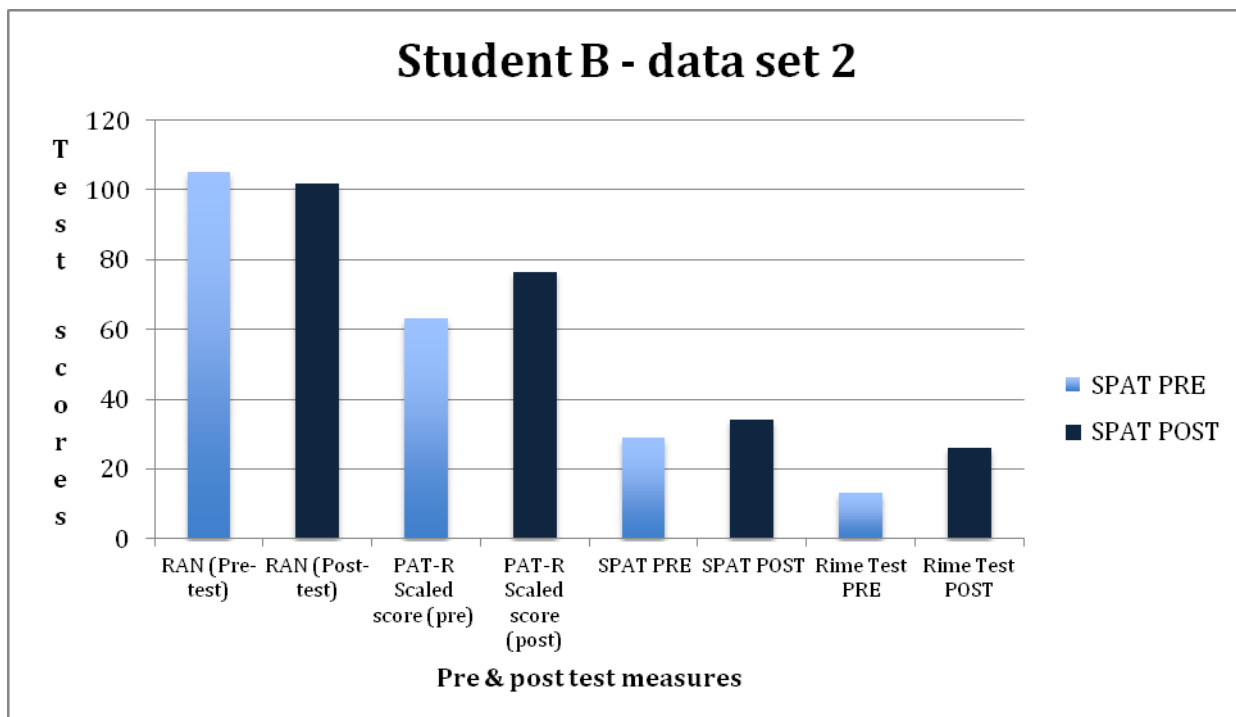
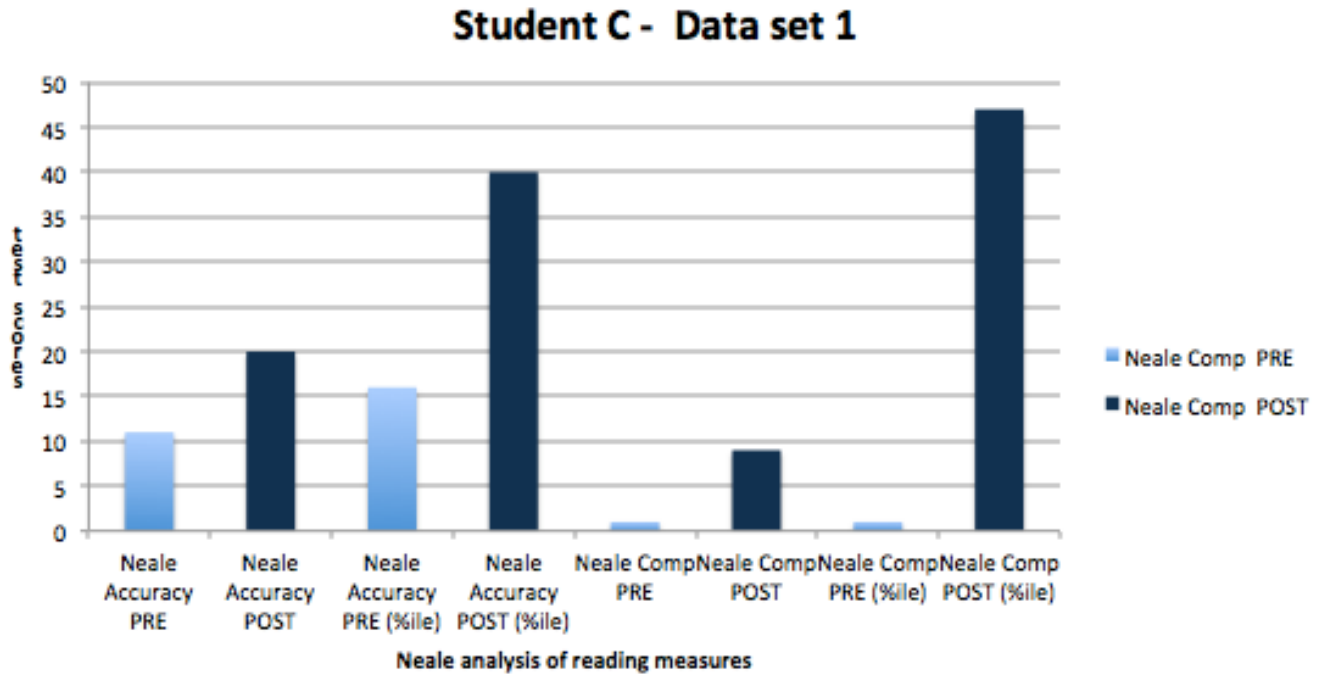


Figure 4

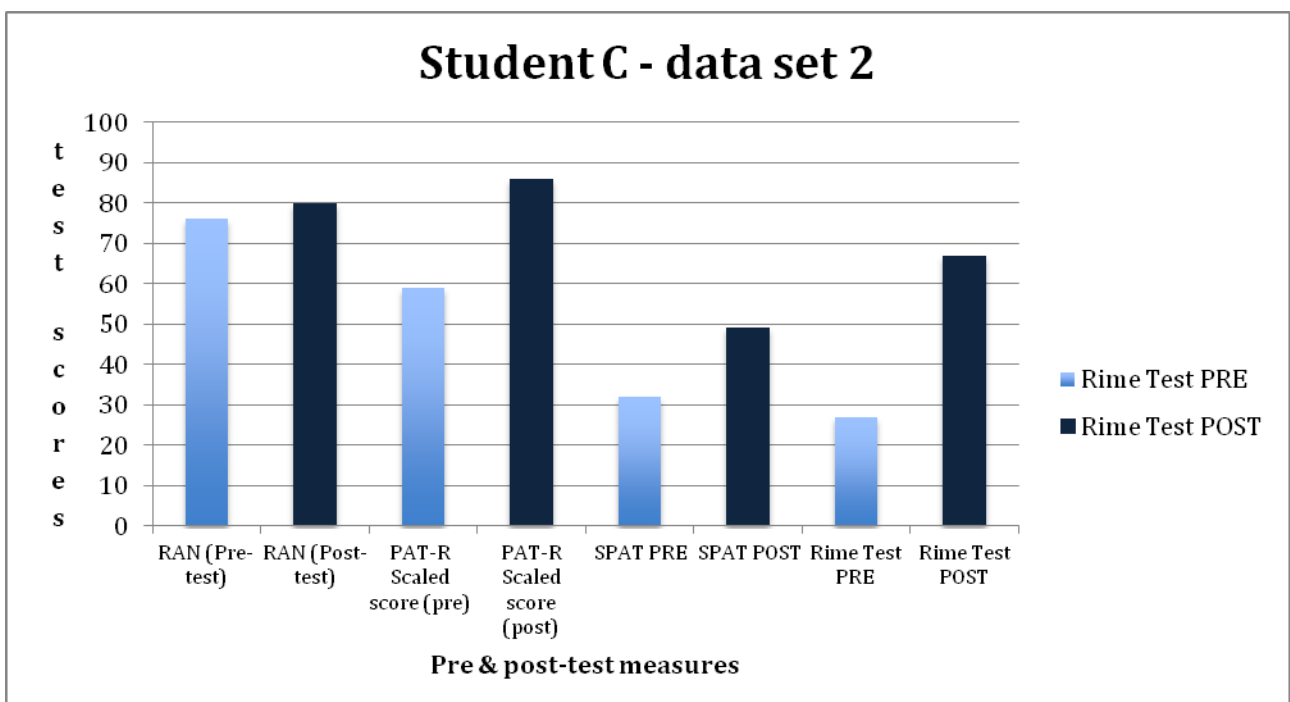
Student C (Figures 5 & 6) displayed the greatest level of enthusiasm and engagement throughout the learning process. He was also very keen to answer the other student’s questions and read any words they found difficult. Consequently Student C demonstrated the most improvement in the teaching group, on all measures, except rapid automatic naming (RAN). While student C’s post-test RAN time was only 5 seconds slower than on pre-testing both of these scores are well below the other teaching group members and well within the normal range for his age, according to CELF-4 criterion. The considerable improvement in student C’s ability to rapidly and accurately read words on the Neale and Rime unit test lead to even greater gains in his comprehension. While reading the post-test text it was noted that student C employed a number of effective reading strategies that weren’t evident on pre-testing. These included analogy, segmenting unknown words into onset and rime then blending into a known word as well as rereading the sentence to check for meaning. A remarkable pre/post test gain of 26.8 scaled scores for student C on the PAT-R continues to support the Neale and Rime test results. This confirms the general trend that improved word reading accuracy contributed to the development of his reading comprehension.

Figure 5



Analysis of Student C’s monitoring data indicates his rate or ability to automatically segment and blend onsets and rimes improved more steadily over time than the other two students. In figure 10, Student C had considerably slower rates in lessons five and nine when attempting the more difficult task of segmenting and blending 3 different onsets with 3 different rimes. During these tasks he occasionally reverted to the slower process of subvocalizing the onset and rime before blending rather than reading automatically. Student C also occasionally inserted an “l” sound between the onset and rime, which he needed to check and self-correct. These errors would again explain the slower rate. The teacher rarely need to correct student C’s errors.

Figure 6



Possibly one of the most significant outcomes for student C was the growing confidence in his ability to a) read words and sentences fluently, b) comprehend text and b) discuss the learning process. This is evident in table 5 (Appendix 6) as Student C’s articulation and reflections were less vague as the lessons progressed.

Monitoring data was collected for the teaching students throughout the lessons. This data is represented in Figures 7, 8, 9 and 10.

Figure 7 charts the time in seconds taken by each student to blend 10 separate onsets with each rime unit named on the horizontal axis.

Students were timed for 2 rime units per lesson across 10 separate lessons. The rate of blending onset and rime is an indicator of how quickly or automatically the students could read each word or non-word. This graph depicts significant fluctuations in automaticity across time, particularly for students A and B. All students’ rate of blending improved consistently until lesson 4, when 2 consonant blends were included in the 10 onsets, making the task more complex for students. The linear trend lines create a moving average which smoothes out the fluctuations in the data. These trend lines show a clear improvement in all students’ rates of blending onset and rime, hence word reading automaticity across time.

Figure 7

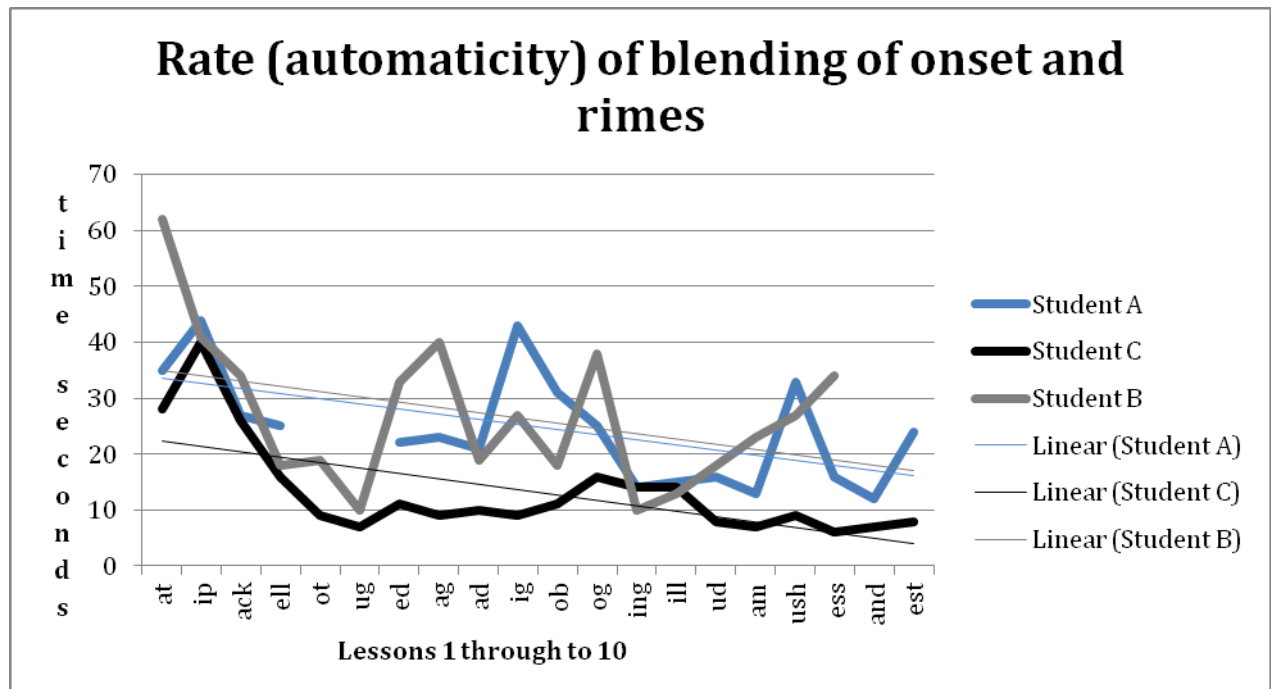
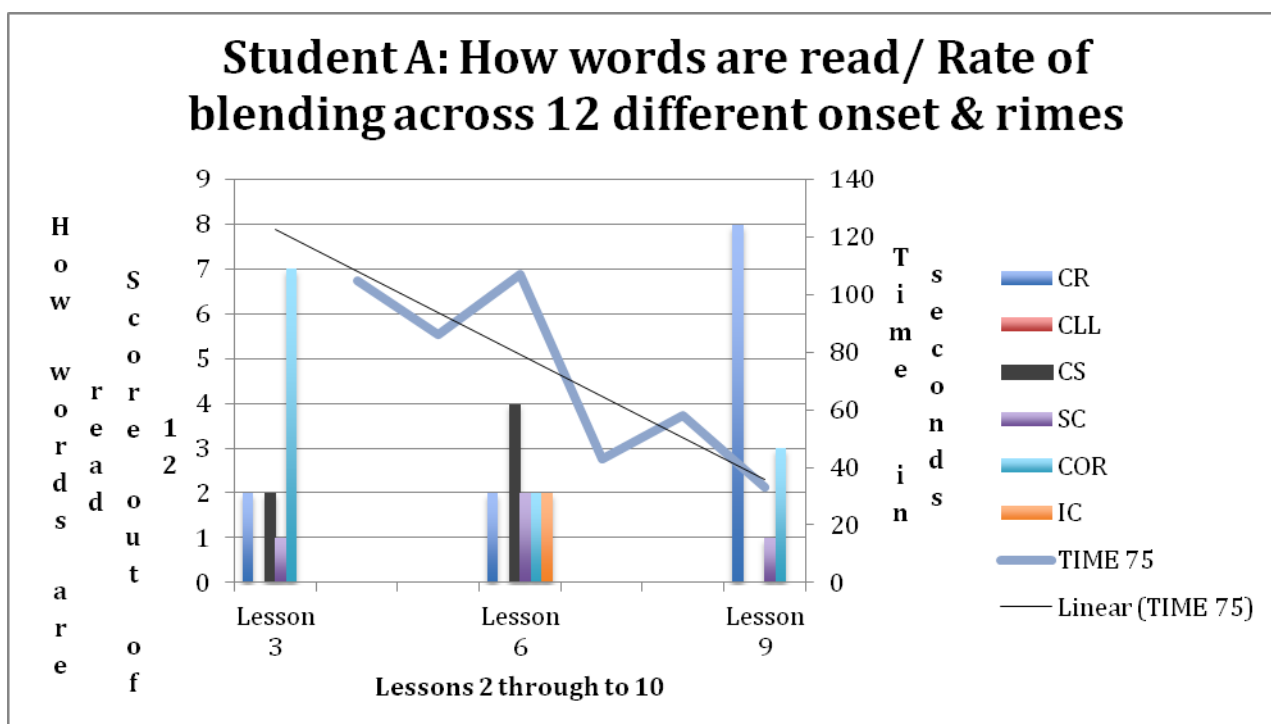


Figure 8



Figures 8, 9 and 10 show 2 separate sets of results for each of the teaching students. The column graph, which uses, primary axis represents how the students read each of the 12 word/pseudowords according to the key on the right hand side. The line graph, which uses the secondary vertical axis, represents the time in seconds taken by each student to blend 3 separate onsets with 4 previously learned rimes to read a total of 12 words and pseudowords across 9 lessons. Their results were recorded on 3 separate occasions during lessons 3, 6 and 9.

Figure 9

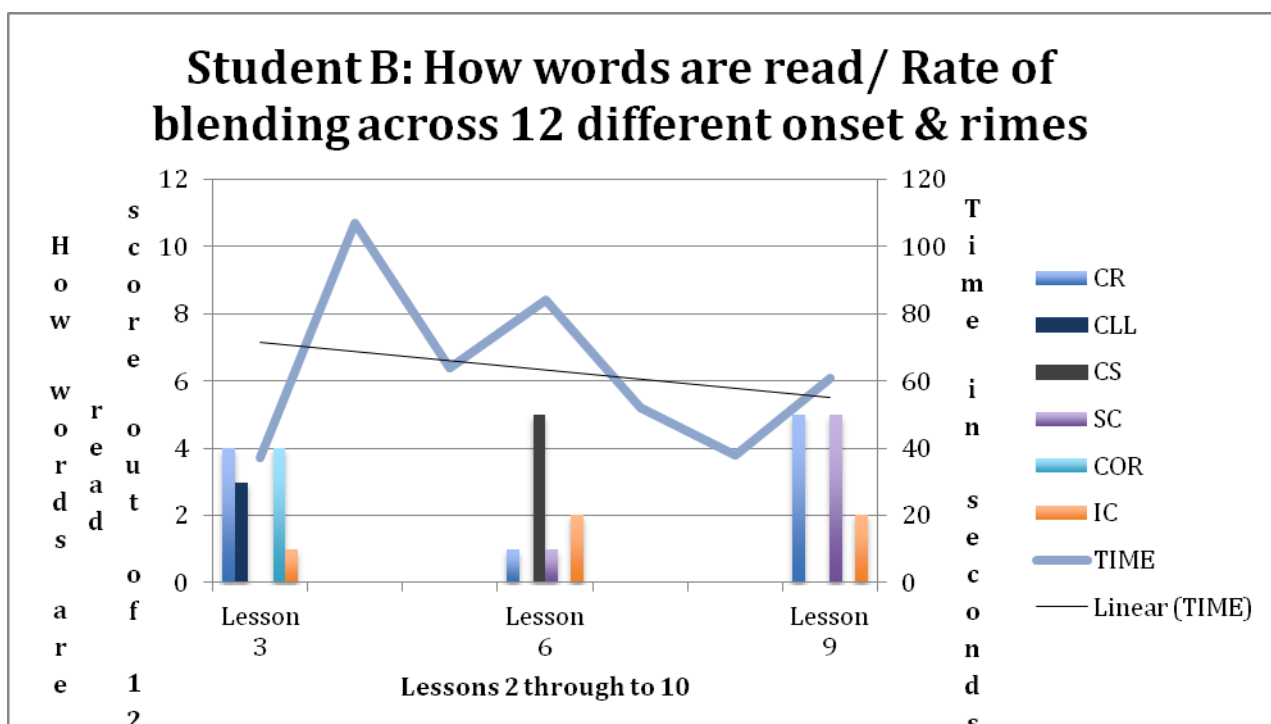
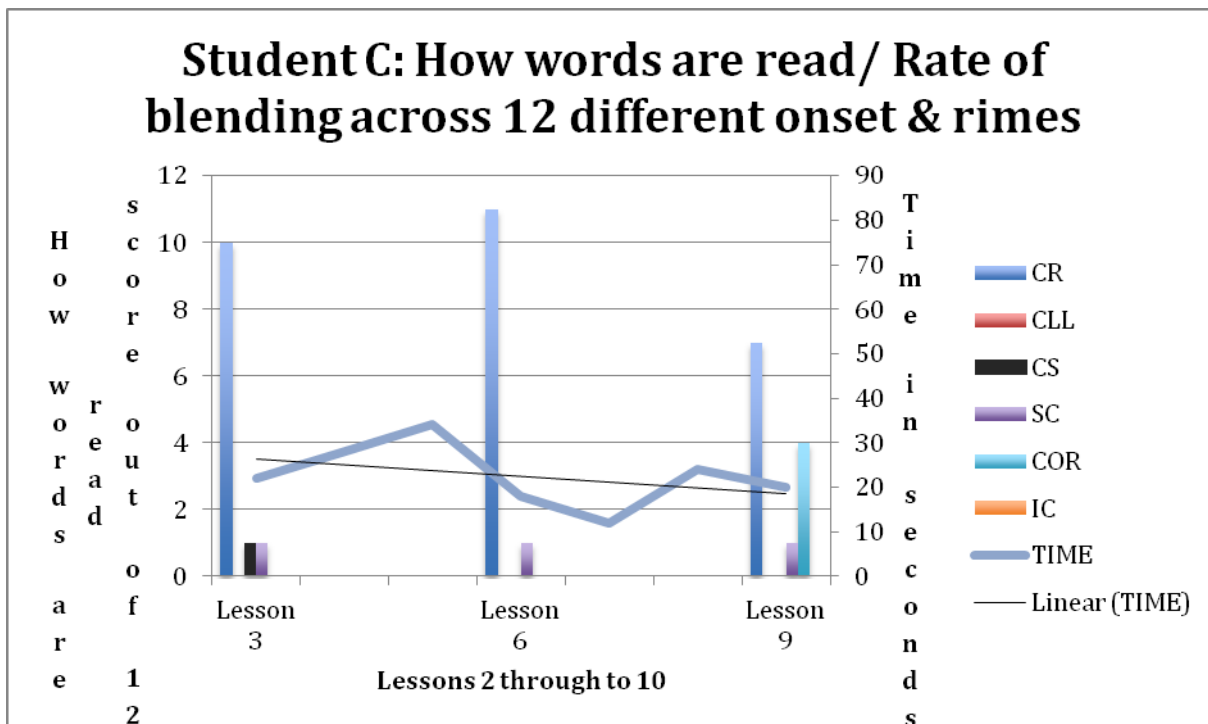


Figure 10



Again there were fluctuations in the students' results over the time period in which the lessons took place. The trendlines show some improvement in all of the students' rates of blending across different onsets and rimes but the rates of gain are much smaller compared to the results in Figure 7. Each of the student's performances varied greatly on how they read each word/pseudoword. Student A clearly improved in her ability to read words correctly and rapidly. Student B read more words correctly and rapidly by the final session but still read some words incorrectly. He was more likely to self-correct responses and less likely to read inefficiently via letter by letter recoding. Student C improved in his ability to read words correctly and rapidly over the first 2 sessions but reverted to sub-vocalizing the onset rime more frequently in the final session.

While the primary goal of this study was to facilitate improved word reading accuracy, it is obvious from the post-test results of each of the teaching students, that the intervention program also impacted on other crucial areas of literacy development. Phonological and phonemic awareness, rapid automatic naming and reading comprehension were all positively influenced by the teaching methodology in this study.

Discussion

The results of this study lends support for the hypothesis and the research, which suggests that, teaching at-risk early readers phonological and orthographic knowledge in blending and segmenting words in context improves word reading accuracy. The explicit teaching process would need to take place over a greater period of time in order to bring about significant change to more students however the trends indicated many positive outcomes. Compared with the control group, the students in the teaching group generally developed a better word reading strategy of segmenting and blending into onset and rime, which allowed them to read words more automatically and accurately. They also demonstrated gains in phonological knowledge, reading fluency, comprehension and the ability to accurately reflect on the learning process.

The results lend support to the work of Munro (1998), Bus and IJzendoorn (1999) and Ryder et al (2008) who suggest that teaching programs focusing on the development on phonological and orthographic knowledge in the context of printed text are more effective in helping young children to learn to read words. Hulme et al (2005) also add that that these two foundational skills need to be taught within the wider context of language. Language skills such as vocabulary, story grammar knowledge and comprehension of longer sentences also impact on reading outcomes for all students. (CECV, 2011) All of the teaching group students in this study had greater difficulty segmenting and blending the pseudowords. This may have been due to the fact that the pseudowords didn't match with words in their current vocabulary ie; they had no way of evaluating the accuracy of these words with their language skills.

One of the most impressive outcomes of this study was the improvement in the students' use of language to reflect on the learning throughout the lessons. (Table 5 in appendix 6) Students were given opportunities to listen to the repeated language models provided by both the teacher and other group members. Students were encouraged to justify their responses, to reflect on their new knowledge and articulate how they can use this new knowledge to read other words. For example; Student C reflected in lesson 7; "Now I can read *will*, I can read other words that end in 'ill' like *pill*, *kill*, *still*." Justifying and discussing their responses verbally provided the students with an opportunity to reflect on their "odd one out responses" or how they read the words. Only then, during the reflection phase, did the students self-correct their errors and talk about words in terms of "onset and rime", "starts and ends of words" and "sound and letter patterns". This reviewing phase facilitated what they'd learned to be part of their long-term knowledge. This certainly has broader implications for effective, sustainable teaching practices and supports the model developed by Collins et al (1998). Engaging students in oral language based tasks through focused discussion may facilitate

more effective teaching and learning. Further research might investigate the influence of oral language on learning in other areas of the curriculum such as numeracy, spelling and behaviour management.

A similar teaching approach for at-risk grade one readers was employed by Juel and Minden-Cupp (2001). These researchers advocated implementing a “hands on” teaching approach as being most effective. The current study provided hands on materials such as cards and reading rods to practise segmenting and blending onsets and rimes. The teaching group students enjoyed manipulating each onset rod to blend it with a new rime unit rod. As the students knew that this was a timed task they not only had to segment and blend quickly but move the onset across to the next rime unit quickly. The physical movement combined with the phonemic recoding of onset and rime may have assisted the students learning to read with improved accuracy and automaticity and warrants further investigation.

All students in this study had mastered single letter-sound recoding (Table 1) and had some basic phonological knowledge. Being able to recognise and generate rhyming words enabled the students to successfully engage in most of the learning tasks. As suggested by the research, onset and rime instruction is most effective for students who have both of these skills in place. (Juel and Minden-Cupp, 2001; Moustafa, 2000) In the early phases of the teaching, student A still had some difficulty with recoding the letters “y” and “w”. This impacted on her automaticity rates. By lessons 8 and 9 these letters were well established and her rates improved considerably. These results have implications for those wishing to repeat this study. This program is most effective for students who have acquired all of their letter-sound knowledge and developed foundation skills in phonological and phonemic awareness.

Another factor, which needs addressing, if replicating this study or continuing teaching these students, is changing the frequency and duration of the lessons. The lessons in this study could only be conducted twice weekly over a five week period. Students A and B (Table 1) only attended 9 lessons. Anecdotal evidence confirmed that these students’ required more scaffolding to achieve success in the next lesson. A higher frequency ie; 3 or more session per week would more likely have a greater impact on the students’ learning of knowledge, ideas and strategies. The researcher also believes that in order to produce more sustainable reading outcomes this program would need to run for a much longer duration.

During the earlier lessons the students relied heavily on subvocalising the onset and rime before blending these to read the word or pseudoword. As the lessons progressed student’s A and C were able to consistently read these words more automatically (Figures 7, 8 and 10). Rapid naming or speed of processing has been found to have a significant impact on reading

achievement. (Catts et al, 2002 and Serry et al, 2008). All students in the teaching group demonstrated age appropriate RAN skills both pre and post testing. Perhaps this teaching program is most effective for students with RAN skills within normal limits and appears to have an even greater impact on those students with faster RAN skills eg; student C. Further investigation might explore the effectiveness of this study's intervention program for students with poor RAN skills or ascertain the level of RAN required to achieve the greatest impact on reading outcomes.

The monitoring data in figure 7 revealed a common trend amongst the teaching group. As the students became aware of the re-occurring rime unit it was easier and quicker for them to read the other nine words/pseudowords in sequence. The students were "tuned-in" to the two key rime units and eagerly searched for and highlighted these target rime units within words within the text. The teaching methodology provided opportunities for the students to hear phonologically and see orthographically these larger chunks or rime units. This made it easier for the students to form analogies to read new words and pseudowords more automatically. Comparison of the two groups post-test performance on the rime unit test also revealed that the control students were less likely to use onset rime recoding to read the words. These results support the findings of Moustafa, 1995 and Goswami et al, 1992, whereby students were able to read pseudo words more efficiently using onset rime analogies than phoneme blending. They claimed word end analogies based on the rime unit are a much more accessible and predictable linguistic unit within the syllable for students to learn. Given these results future intervention for these students might include explicit teaching of more complex rime units within words. Such teaching might include dependable rime units or longer rime units containing long vowels with a VVC or VVCC structure.

The value of reading larger chunks, eg; rime units, within the syllable has significant implications for teaching these students and others within the school to read multisyllable words. Once students are able to read monosyllabic words automatically they can start to make analogies and recognize shared sound and letter patterns to read unfamiliar words. Readers may then develop representations of multisyllable words by combining onset rime segments of 1 syllable words. By drawing on various types of knowledge eg; phonemic segmenting and blending, analogy, students can more successfully read words of 2 or more syllables.

Although the primary prediction was for the intervention to improve word reading accuracy, the remarkable gains in reading comprehension was quite unpredicted. This might be explained by the use story reading (context) and story retells as key elements of the teaching practice.

The teacher and students read stories loaded with the target rime units. Throughout the lesson most of the target words related directly back to the story or text. By teaching these target words in context the students were able to make more meaningful associations with other words in the text. Anecdotal notes from the lessons indicated that the accuracy of students' retells varied each week but the amount of detail they were able to provide increased. This supports the claims of (Cassady & Smith, 2004) who suggest that contextualised reading instruction promotes better reading comprehension. Further research might investigate whether this teaching methodology improves deeper understanding or inferential comprehension of text.

Although self-efficacy wasn't formally assessed, each of the teaching group students exhibited improved engagement and motivation throughout the learning process. The students readily and often independently, reflected on their learning and achievements. Prior to the intervention program these students were reported by their teachers and parents as "reluctant and struggling readers." On post-testing, the teaching group students and particularly student C, not only read more text more fluently, they self-corrected and engaged in more effective strategy use. They appeared to value the process of segmenting and blending the onset and rime in words to read words more effectively. These observations are consistent with the work of Tunmer and Chapman (2002). Their study confirmed that beginning readers who developed improved word identification strategies showed more positive self-efficacy beliefs.

These results suggest word reading accuracy can be improved using a multi-faceted, focused teaching approach as used in this study. Which explicit teaching task or variable had the greatest impact on the reading outcomes is unknown. The teaching students outperformed the control students on all post-test phonologically based tasks. (Table 2). These gains suggest that the teaching of phonological knowledge concurrently with orthographic knowledge in segmenting and blending onset and rime is essential for improved reading outcomes. The teaching students benefited from the "hands-on", explicit practice, in automatically segmenting and blending the spoken and written word into onset and rime. Other key elements of this successful intervention included using words from the context of a story, facilitating a retell and engaging students in oral language tasks to reflect on the learning. The success of the short, explicit intervention has significant implications for all early years teachers working with struggling readers. It can easily be applied to small group instruction within the classroom. As Ryder et al. (2008) found, even teacher aides with training and support could deliver the lessons and have a sustained impact on the reading behavior of young students.

Bibliography

Adams, M. (1990). *Beginning to read: thinking and learning about print*. Cambridge, Mass: MIT Press.

Bus, A. G., & van IJzendoorn. (1999) Phonological awareness and early reading a meta-analysis of experimental training studies. *Journal of Educational Psychology*, 91, 3, 403-414.

Catts, H. W., Gillispie, M., Leonard, L. B., Kail, R. V., & Miller, C. A. (2002). The role of speed of processing, rapid naming and phonological awareness in reading achievement. *Journal of Learning Disabilities*, 35, 6, 509-524.

Cassady, J., & Smith, L. L. (2004). Acquisition of blending skills: Comparisons among body-coda, onset-rime, and phoneme blending tasks. *Reading Psychology*, 25, 261-272.

Catholic Education Commission of Victoria (CECV) Ltd. & Australian government (DEEWR) OLSEL research report findings. (2011)
http://www.olsel.catholic.edu.au/uploads/cknw/files/OLSEL%20research%20Report%20Findings_web_R.pdf Downloaded 20/8/11

Ehri, L. C. (2005) Learning to read words: theory, findings, and issues. *Scientific Studies of Reading*, 9, 2, 167-188.

Hulme, C., Snowling, M., Caravolas, M., & Carroll, J. (2005). Phonological skills are (Probably) one cause of success in learning to read: A comment on Castles and Coltheart. *Scientific Studies of Reading*, 9, 4, 351-365

Juel, C. & Minden-Cupp, C. (2001). *Learning To Read Words: Linguistic Units and Strategies*. University of Virginia
www.ciera.org/library/reports/inquiry-1/1-008/Report%201-008.html
Downloaded 1/10/11

Goswami, U., & Mead, F. (1992). Onset and rime analogies in reading. *Reading Research Quarterly*, 27, 2, 152-162.

Love, E., & Reilly, S. (1998). Phonological awareness: The why and how of its practical application in the classroom. *Australian Journal of Learning Disabilities*, 3, 2, 38-40.

Moseley, D., & Poole, S. (2001). The advantages of rime-prompting: a comparison study of prompting methods when hearing children read. *Journal of Research in Reading*, 24, 2, 163-172.

Moustafa, M. (2000). *Whole-to-Parts Phonics Instruction*. Los Angeles, CA: CSU. [on-line].
http://www.instructional1.calstatela.edu/mmousta/Whole-to-Parts_Phonics_Instruction.html
Downloaded 1/10/11

Moustafa, M. (1995) Children's productive phonological recoding. *Reading Research Quarterly*, 30, 3, 464-476.

Munro, J. K. (1998). Phonological and phonemic awareness: Their impact on learning to read prose and to spell. *Australian Journal of Learning Disabilities*, 3, 2, 15-21.

Ryder, J.F., Tunmer, W. E., & Greaney, K.T., (2008). Explicit instruction in phonemic awareness and phonemically based decoding skills as an intervention strategy for struggling readers in whole language classrooms. *Reading and Writing*, 21, 4, 349-369.

Serry, T., Rose, M., & Liamputtong, P. (2008) Oral language predictors for the at-risk reader: A review. *International Journal of Speech-Language Pathology*, 10, 6, 392-403.

Stahl, S. & McKenna, M. (2000). *The Concurrent Development of Phonological Awareness, Word Recognition and Spelling*.
<http://www.ciera.org/library/archive/2001-07/200107.html>
Downloaded 20 Aug, 2011.

Stahl, S.A., & Murray, B. A. (1994) Defining phonological awareness and its relationship to early reading. *Journal of Educational Psychology*, 86, 2, 221-234

Tunmer, W.E., & Chapman, J.W. (2002) The relation of beginning readers' reported word identification strategies to reading achievement, reading-related skills, and academic self-perceptions. *Reading and Writing: An Interdisciplinary Journal*, 15, 341-358.

Test and teaching materials

ACER Press. (2008) Progressive Achievement Tests in Reading – 4th Edition (PAT-R revised) Reading Comprehension sub-test.

Dalheim, B. (2004) The Rime Unit Test.

Munro, J. K. (2011). EDUC472697. Literacy Intervention Strategies. Lecture notes. 2011.

Neale, M. (1999) Neale Analysis of Reading Ability (Revised)
Camberwell: ACER

Neilson, R. (2003) Sutherland Test of Phonological Awareness-Revised

Semel, E., Wiig, E. H., & Secord, W. (2006) Clinical Evaluation of Language Fundamentals-Fourth Edition-Australian. Harcourt assessment, Inc. Rapid Automatic Naming sub-test.

Appendix 1

Phonological Knowledge & onset-rime instruction using words in context.

SESSION 1 OUTLINE

Activity	Task Description	Time
Text Reading, Oral language Phonological and orthographic tasks	<p>Prior to reading text students are told that they will be listening to a story that has lots of words that rhyme with “at” and “ip” words. They will be asked to predict some of the rhyming words that they might hear in the story. Teacher and students write these words on a white board. Students discuss the word meanings and articulate why they chose these words ie; discuss the common sound patterns.</p> <p>Teacher reads passage with loaded with target rime units.</p> <p>The students reflect on some of the words they predicted that they heard in the story.</p>	8-10 mins
Phonological awareness task	<p>Phonological task – Odd one out task. Students select the word that doesn’t rhyme from a group of 3 pictures. (Appendix 5) Segmenting and blending the spoken onset-rime patterns.</p> <p>Lessons 1,4,7,10; Students reflect on why they selected the “odd one out” word. This is audiotaped and responses analysed according to the key in appendix 7, table 2.</p>	3 -4 mins
Reading Target Words Segmenting task (Use Word Cards, appendix 4)	<p>Teacher demonstrates by putting down one of the word cards. Read the word by first segmenting the onset and rime eg: b – at, then blend together for bat.</p> <p>Student reads the target words on cards provided. Words are presented in a random order. As words are read, cards are left on the table.</p> <p>Words will be a mix of C+ rime, CC + rime & CCC + rime – real and pseudowords</p> <p>After all words have been shown, get the students to put the words in groups based on rime units, real and pseudo words and cue for an explanation for this grouping.</p>	3 – 6 mins
Blending Task	Teacher presents a written onset and written rime unit and demonstrates blending the two parts to read a word. These are written on “the reading rods.	8 mins

<p>(Use Onset & Rime reading rods)</p>	<p>Students blend ten onset rods with each target rime rod to make real and non-words. (This task is timed for each group of 10 words.) Students are aware that this is a timed task and must blend as quickly as possible.</p> <p>The teacher indicates when they have read the word/non-word incorrectly. The student can only move on to the next word when they have read the word correctly. If the student is still incorrect after 3 tries the teacher may segment the word into onset and rime for the student.</p>	
<p>Text Re - reading</p>	<p>Students read the new story which has the same story grammar as text 1 but with a few more target rime words added. Teacher reads with the students if difficulties noted. Make sure the student not reading is following the text appropriately.</p> <p>Each Student takes turns at reading a new sentence. Cue students that they will have to retell the story to a partner.</p> <p>Then ask students to retell the story.</p>	<p>10 mins</p>
<p>Reflection/Exploration</p>	<p>Student(s) comments on what has been learnt in the session. What rime units did they learn today what new words could they now be able to read? (students encouraged to name 2-3 words each if unable the teacher provides suggestions.) This component is audiotaped in lessons 1,4,7 & 10 to record how much scaffolding is required for students to accurately reflect and explore their new learnings. Responses are analysed according to the key in appendix 6, table 5.</p>	<p>4 mins</p>
	<p>Total Session Time</p>	<p>36 – 42 mins</p>

**Phonological knowledge & onset-rime instruction
using words in context.**

SESSIONS 2 -10 OUTLINE

Activity	Task Description	Time
Text Reading, Oral language Phonological and orthographic tasks	<p>Prior to reading text students are told that they will be listening to a story that has lots of words that rhyme with “ack” and “ell” words. They will be asked to predict some of the rhyming words that they might hear in the story. Students write these words on a white board, listing the words according to their rime unit. Students discuss the word meanings and articulate why they chose these words ie; discuss the common sound patterns.</p> <p>Teacher reads passage with loaded with target rime units.</p> <p>The students reflect on some of the words they predicted that they heard in the story.</p>	8-10 mins
Intermittent writing task	Throughout the session the students continue to add to the onset-rime lists of words as they hear and see them during the session. These are written on the white board.	3 mins
Phonological awareness task	Phonological task – Odd one out task. Students select the word that doesn’t rhyme from a group of 3 pictures. (Appendix 5) Segmenting and blending the spoken onset-rime patterns.	3 -4 mins
Reading Target Words Segmenting task (Use Word Cards, Appendix 4)	<p>Teacher demonstrates by putting down one of the word cards. Read the word by first segmenting the onset and rime eg: sn – ack, then blend together for snack.</p> <p>Student reads the target words on cards provided. Words are presented in a random order. As words are read, cards are left on the table.</p> <p>Words will be a mix of C+ rime, CC + rime & CCC + rime – real and pseudowords</p> <p>After all words have been shown, get the students to put the words in groups based on rime units, real and pseudo words and cue for an explanation for this grouping.</p>	3 – 6 mins
Blending Task	Teacher presents a written onset and written rime unit and demonstrates blending the two parts to read	

<p>(Use Onset & Rime reading rods)</p>	<p>a word. These are written on the reading rods.</p> <p>Students blend ten onset rods with each target rime block to make real and non-words. (This task is timed for each group of 10 words.) Students are aware that this is a timed task and must blend as quickly as possible.</p> <p>Students then practice quickly blending 3 separate onsets across the 4 previously learned rimes eg; pack, pell, pat, pip/ rack, rell, rat,rip / mack, mell, mat, mip. These are also timed. (In lessons 3, 6 & 9, the teacher records how each word is read according to the key in appendix 6, table 4.)</p>	<p>8 – 10 mins</p>
<p>Text Re - reading</p>	<p>Students read the story. Teacher reads with the students if difficulties noted. Make sure the student not reading is following the text appropriately.</p> <p>Each Student takes turns at reading 2 new sentences. Cue students that they will have to retell the story to a partner.</p> <p>Then ask students to retell the story.</p>	<p>10 mins</p>
<p>Reflection/Exploration</p>	<p>Student(s) comments on what has been learnt in the session. What rime units did they learn today what new words could they now be able to read? (students encouraged to name 2-3 words each if unable the teacher provides suggestions.) This component is audiotaped in lessons 1,4,7 & 10 to record how much scaffolding is required for students to accurately reflect and explore their new learnings. Responses are analysed according to the key in appendix 6, table 5.</p>	<p>4 mins</p>
	<p>Total Session Time</p>	<p>39 – 47 mins</p>

Appendix 2

ERIK texts used during the lessons

Lesson 1: Pat and Pip catch a rat. (Text created by author, see Appendix 3)

Lesson 2: Ross and Jack go camping

Lesson 3: The school fair

Lesson 4: A race in the snow

Lesson 5: Brad's farm

Lesson 6: My friend Bob

Lesson 7: The house on the hill

Lesson 8: A picnic at the dam

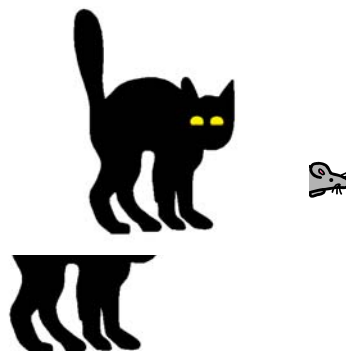
Lesson 9: The party dress

Lesson 10: School sports day

Appendix 3

Lesson 1 text.

Pip and Pat catch a rat



"Look Pat! Catch that fat rat," said Pip.

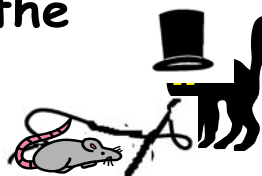
"Look out Pat, he likes to nip."

"Don't slip on the mat or it will rip."

But Pat tripped on the mat and down he sat.

The fat rat ran from Pat the cat.

Look out fat rat there's Pip with a hat and a whip.



Now Pip's got the rat in his hat.

Poor fat rat! That is the end of that rat. **SPLAT!!!!!!!!!!**

Appendix 4

that	flat	wat	hat	splat	fat
cat	dat	rat	fip	slip	mip
whip	flip	nip	lip	trip	pip

sack

back

lack

rack

snack

bell

smell

fell

tell

mell

crack

vack

spell

gell

hell

plell

chack

zack

sug

bug

lug

rug

snug

dot

spot

rot

tot

mot

plug

vug

clot

fot

jot

flot

chug

nug

sag

bag

lag

rag

snag

fed

sped

red

ted

med

brag

vag

clad

bed

ged

fled

chag

mag

bad

glad

jad

had

grad

fad

cad

dad

rad

fig

brig

mig

wig

swig

big

rig

gig

sig

rob

dob

wob

snob

job

lob

hob

vob

blob

sob

dog

mog

slog

wog

hog

log

zog

blog

ring	ding	wing	sling	king	sing
bring	ying	still	thing	dill	mill
kill	will	chill	fill	zill	bill

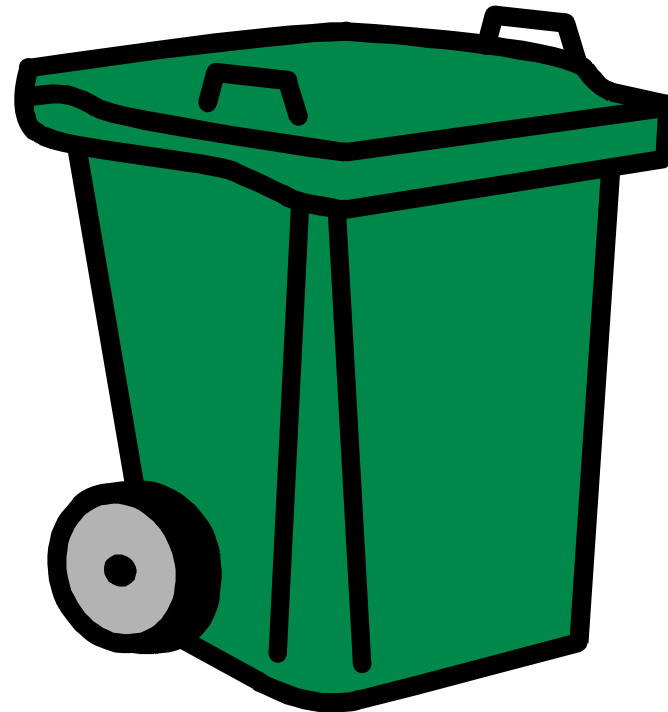
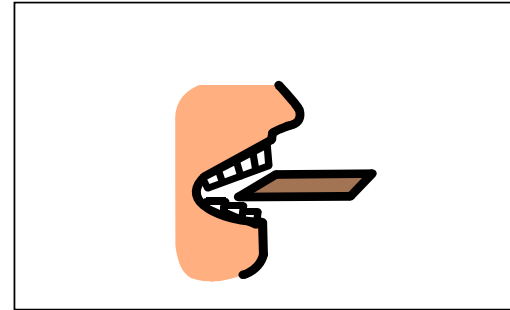
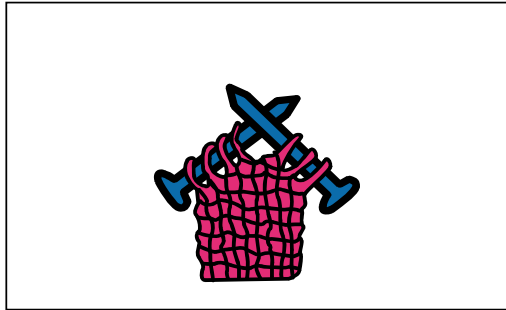
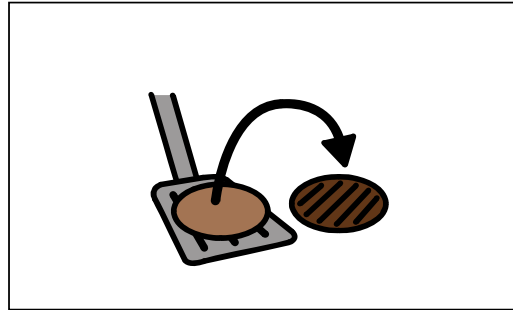
ram	dam	ham	slam	kam	sam
pram	mam	stud	thud	dud	mud
cud	hud	bud	fud	sud	rud

rush	hush	dush	lush	gush	flush
mush	push	bush	less	dress	mess
jess	guess	stress	bless	ness	tess

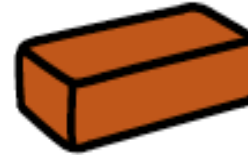
hand	sand	band	vand	land	stand
pand	grand	brand	rest	dest	jest
vest	fest	sest	chest	test	best

Appendix 5

Place the odd one out in the bin

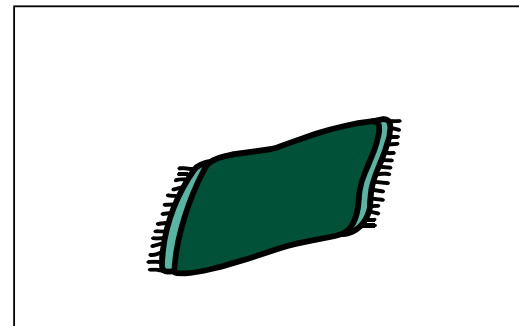
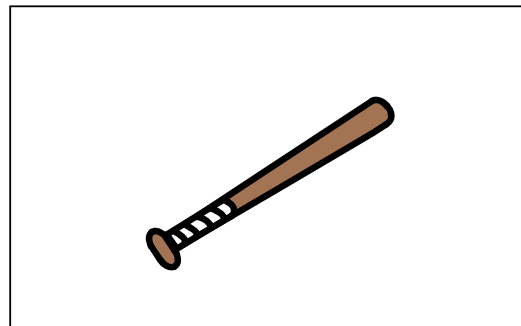
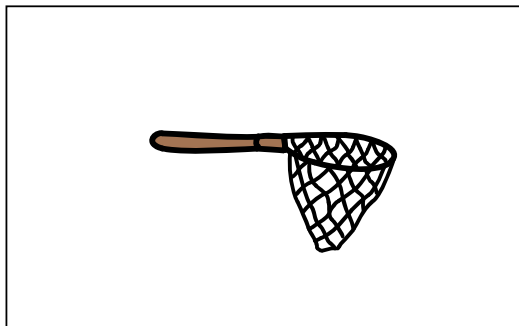
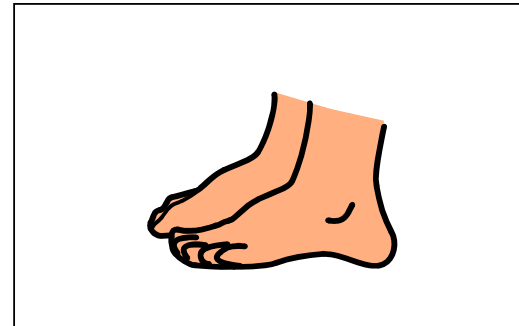
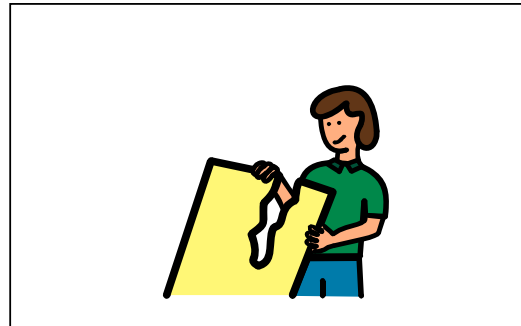
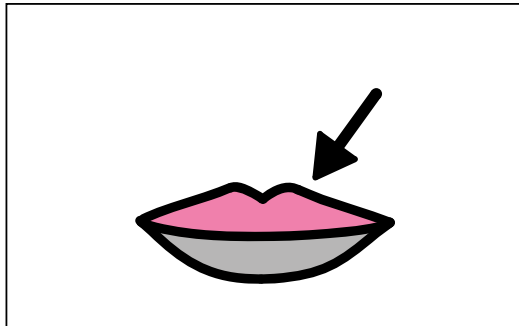
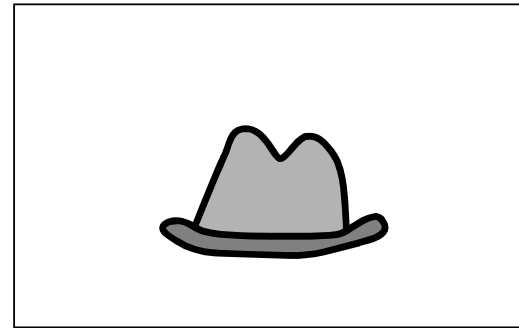
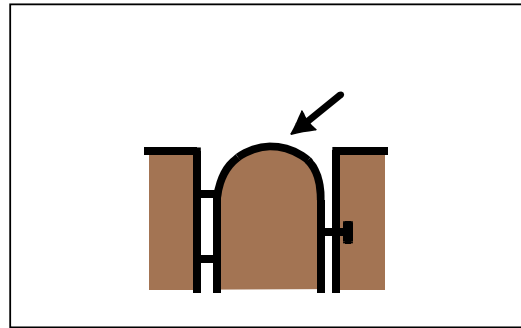
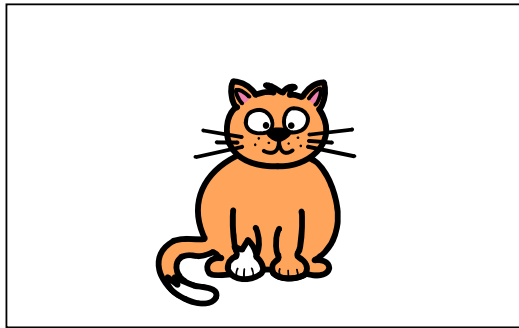


Place the odd one out in the bin



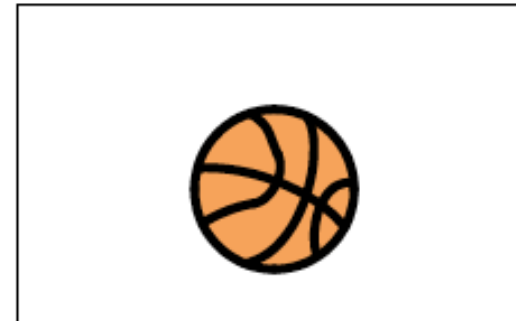
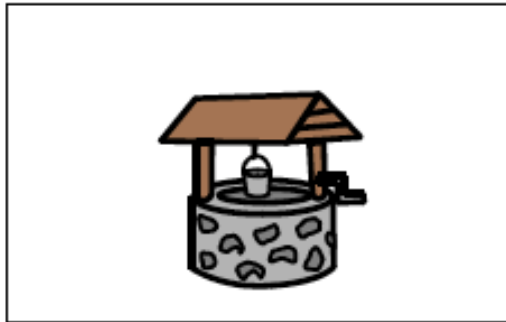
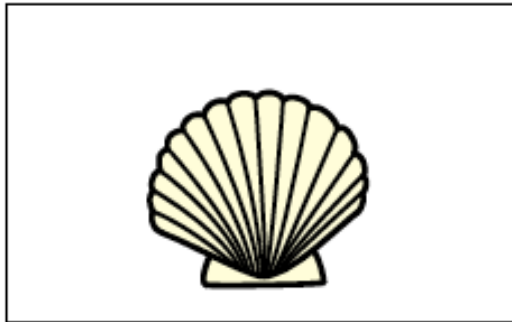
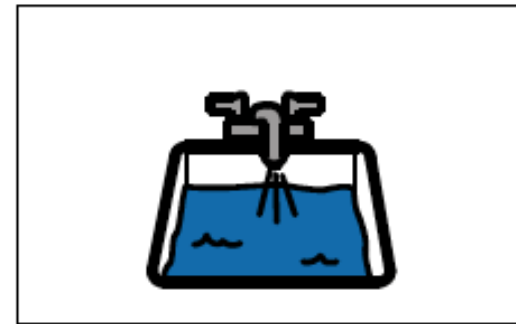
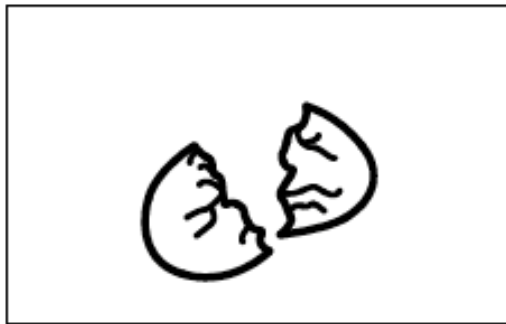
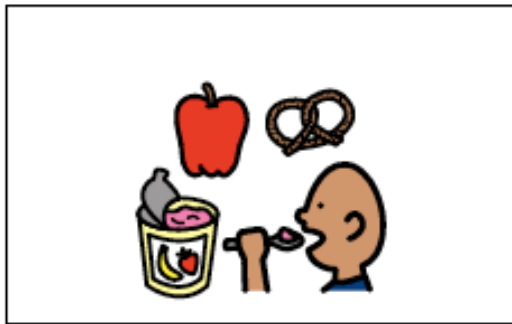
1. clap/flat/fat 2. clip/ship/brick 3. slap/chip/slip

Place the odd one out in the bin



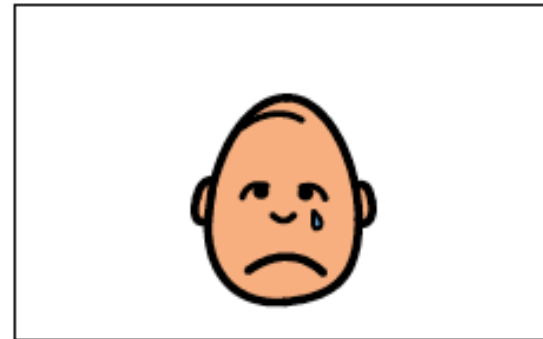
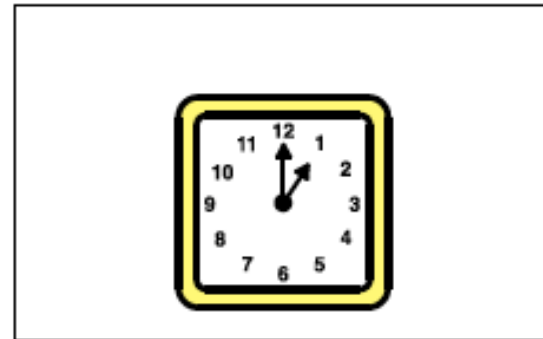
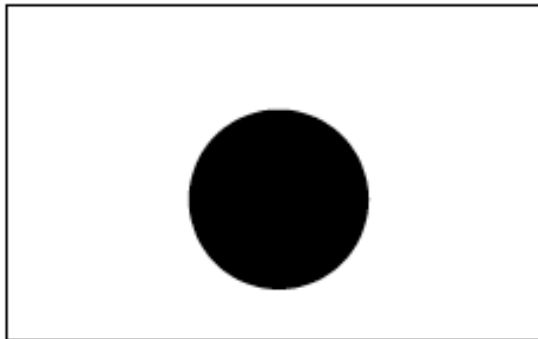
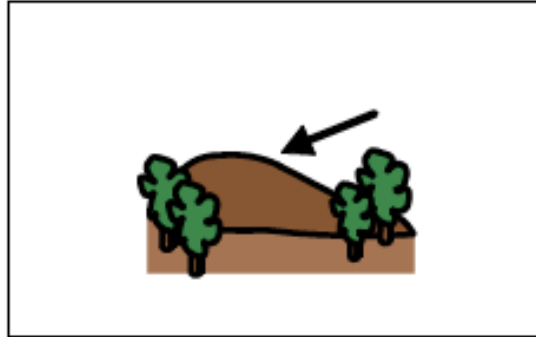
1. cat/gate/hat 2. lip/rip/feet 3. net/bat/mat

Place the odd one out in the bin



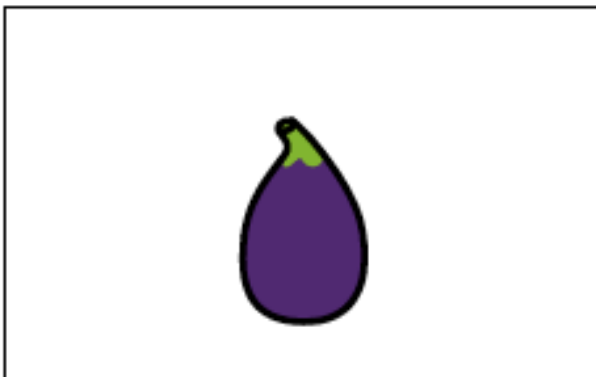
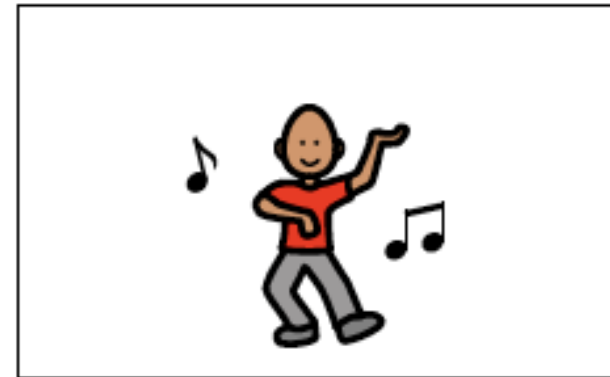
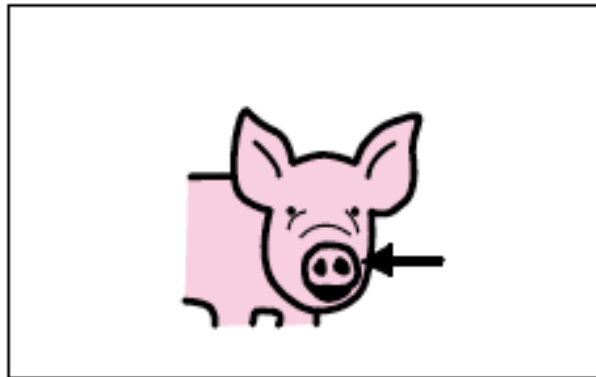
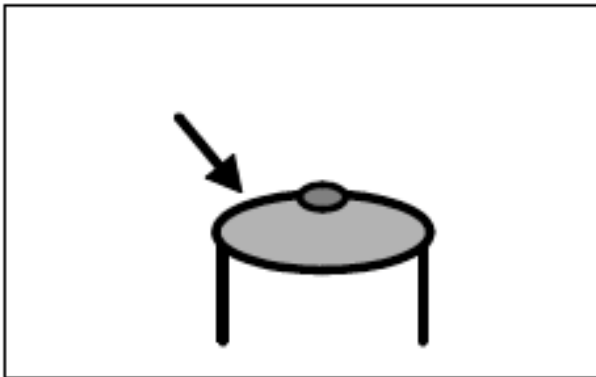
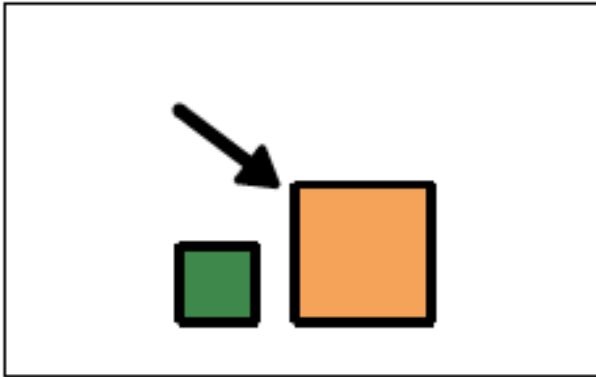
1. snack/crack/tap 2. shell/well/doll 3. fell/smell/ball

Place the odd one out in the bin



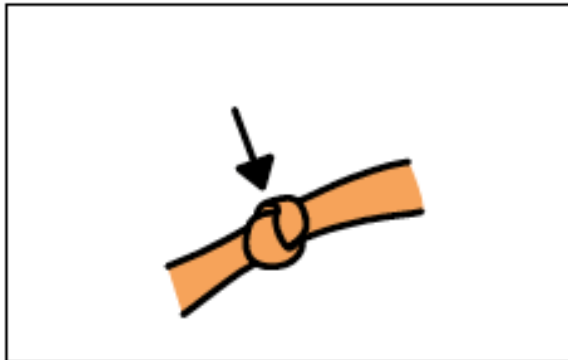
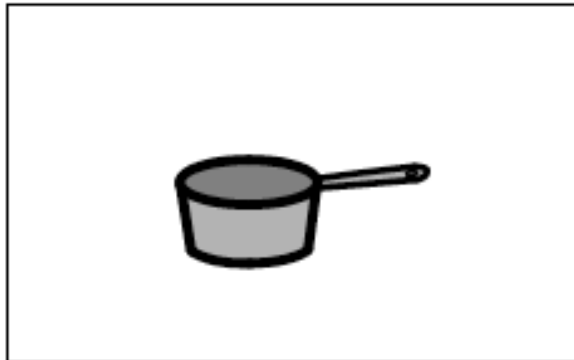
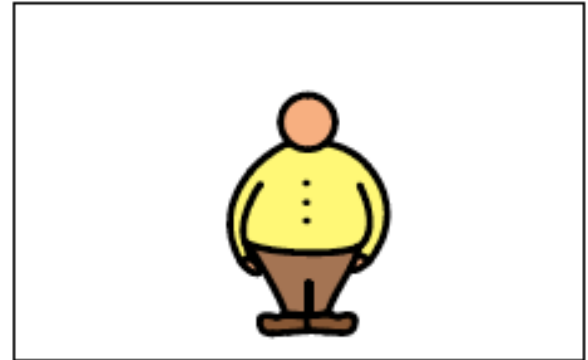
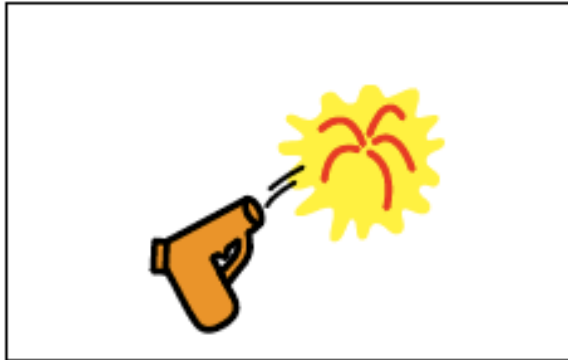
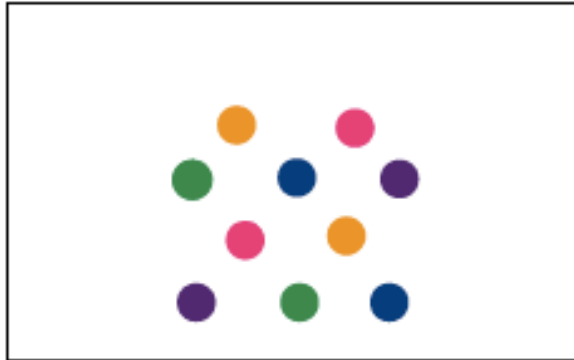
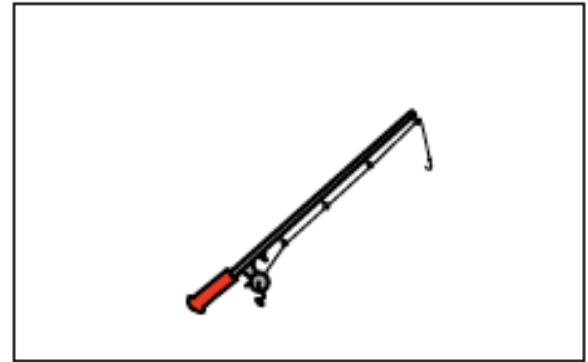
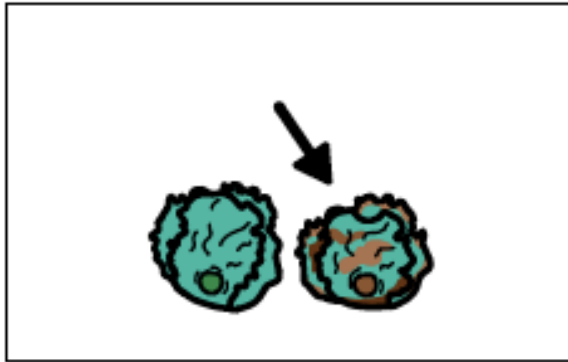
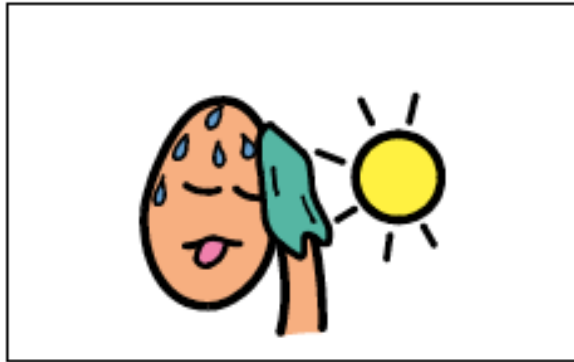
1. bell/hill/well 2. black/pack/clock 3. Smack/sack/sad

Place the odd one out in the bin



1. big/bag/dig 2. lid/pig/jig 3. fig/swig/leg

Place the odd one out in the bin



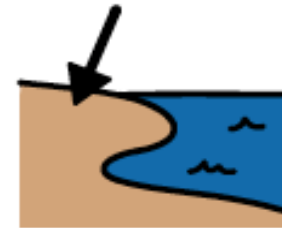
Place the odd one out in the bin



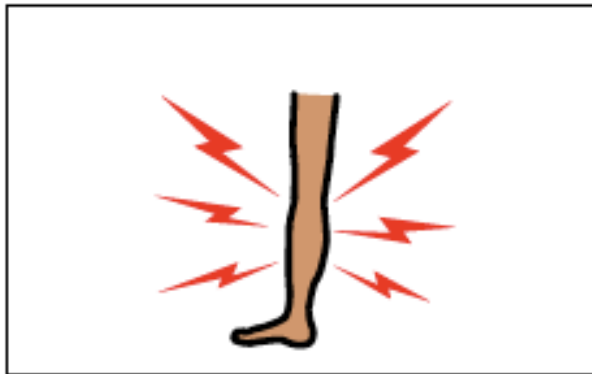
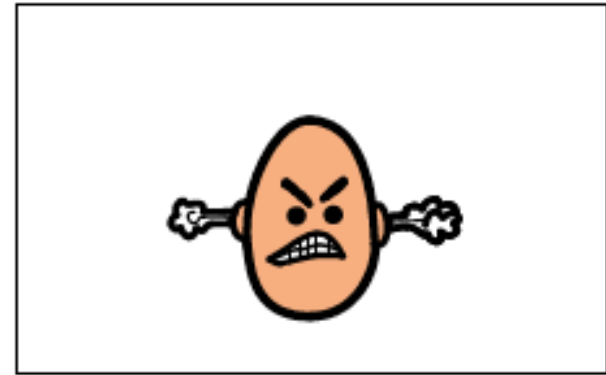
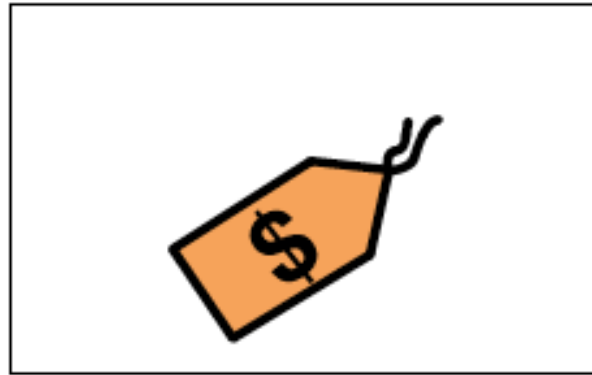
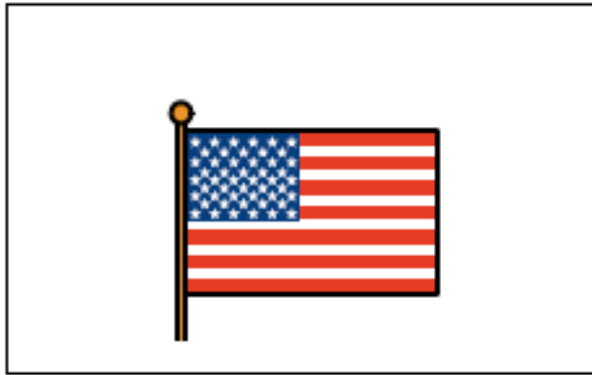
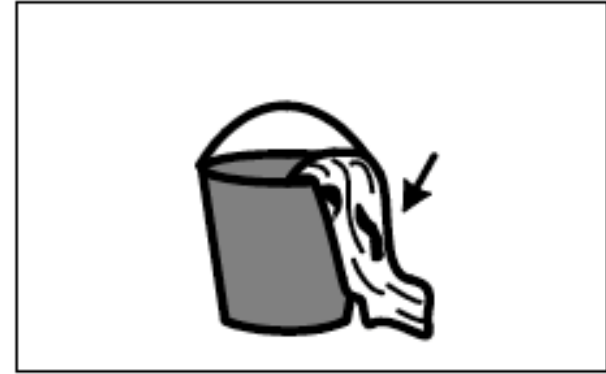
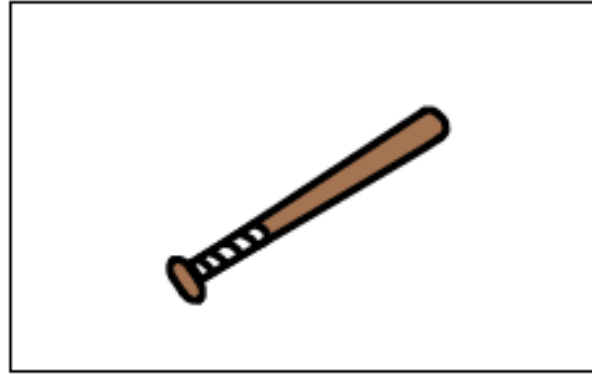
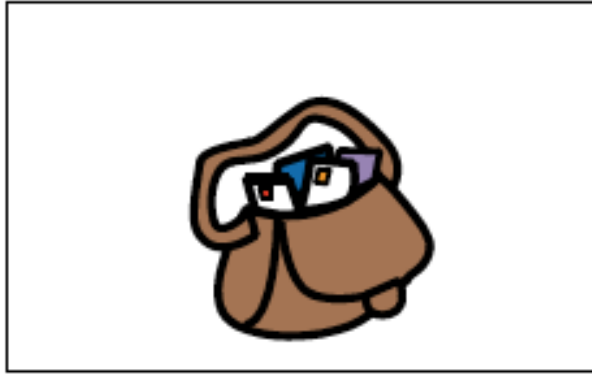
1. hot/r

50bug/bag/rug 2. mug/hug/mud 3. tug/jug/sit

Place the odd one out in the bin

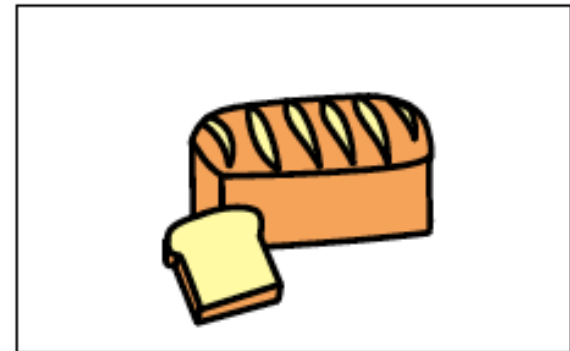
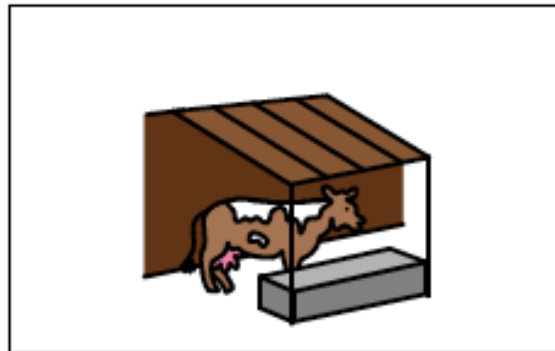
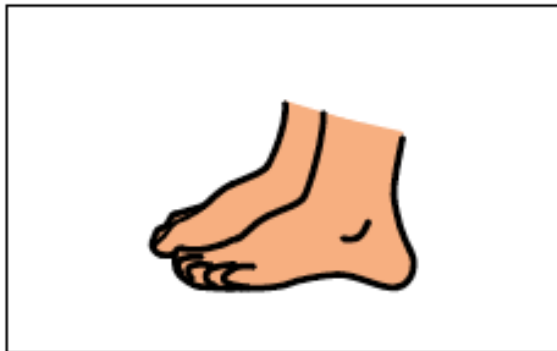
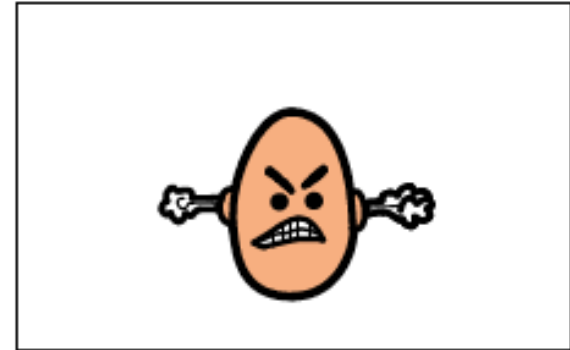
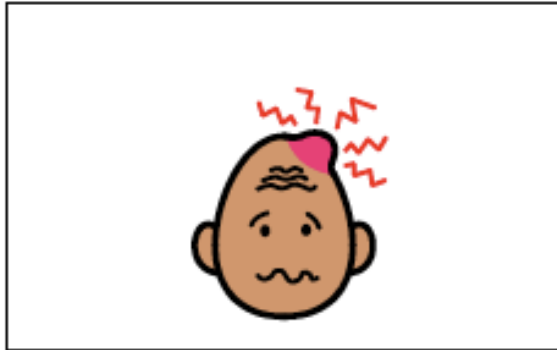
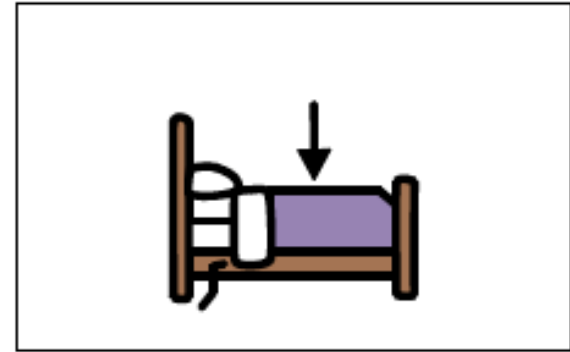
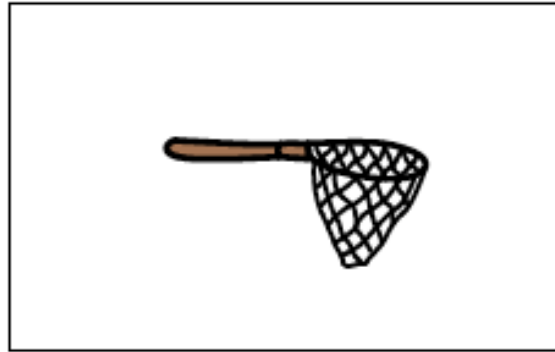
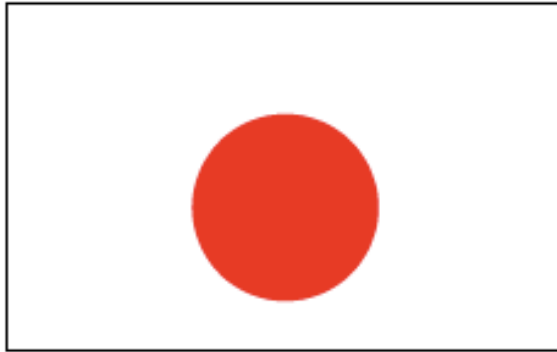


Place the odd one out in the bin



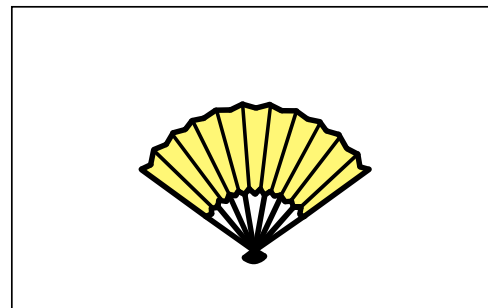
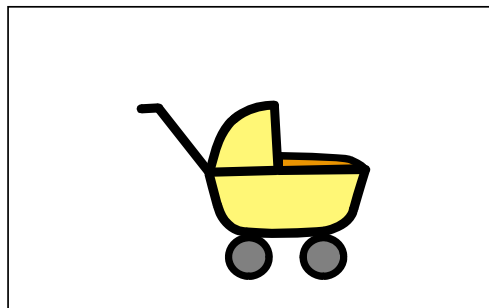
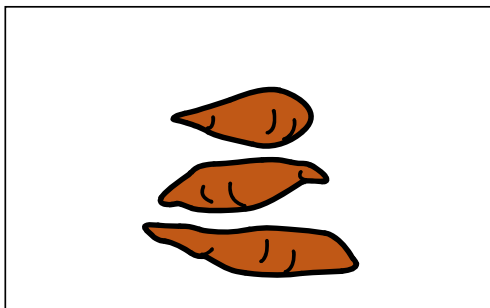
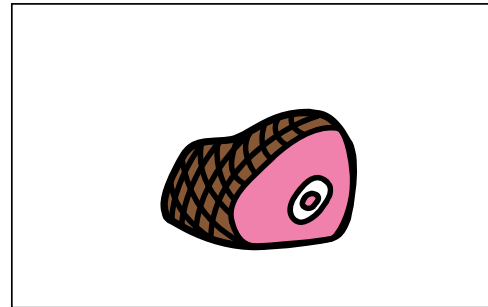
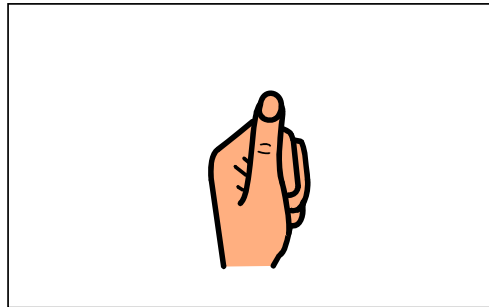
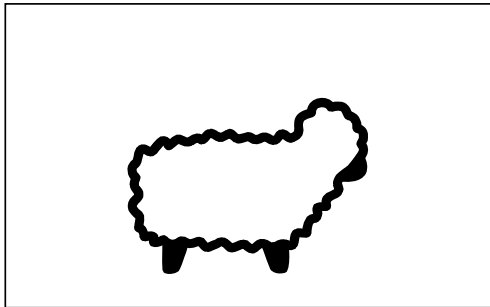
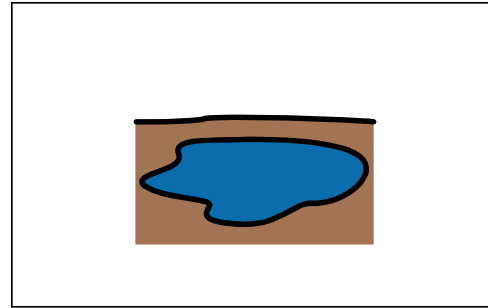
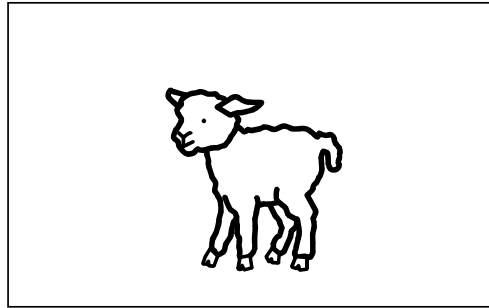
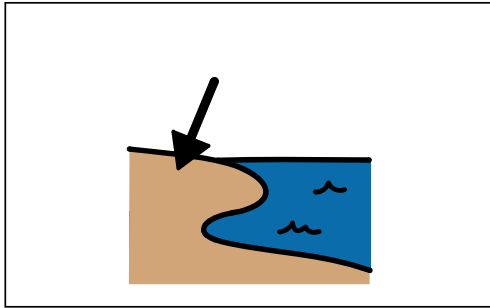
1. sad/ha

Place the odd one out in the bin



1. bag/bat/rag 2. flag/tag/mad 3. leg/swag/brag

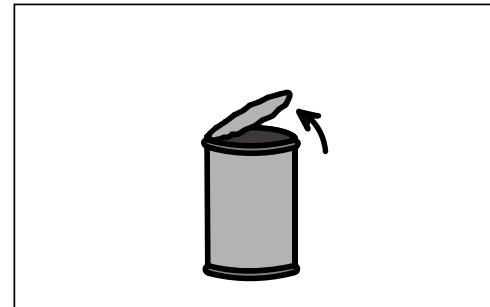
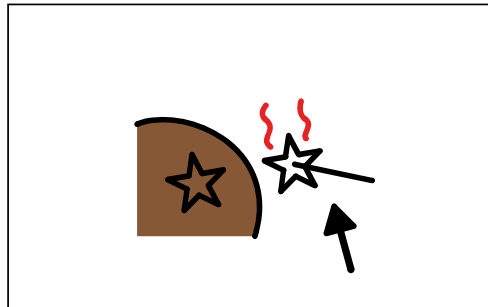
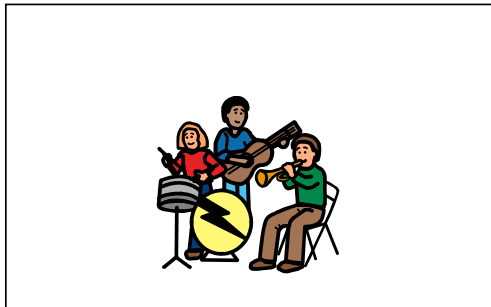
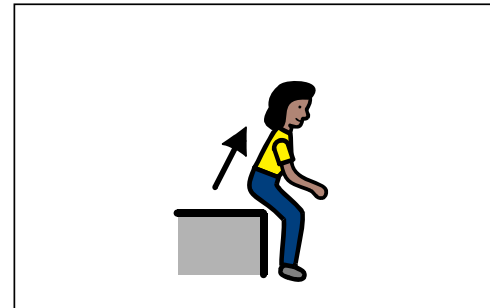
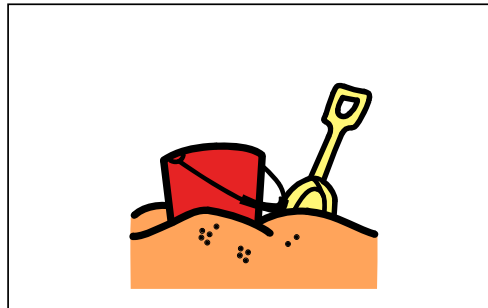
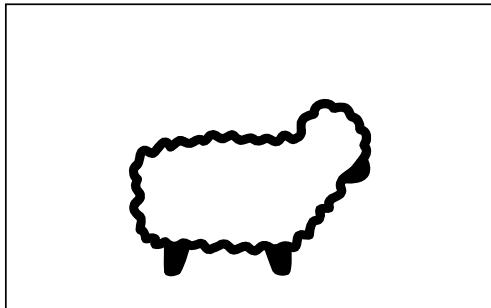
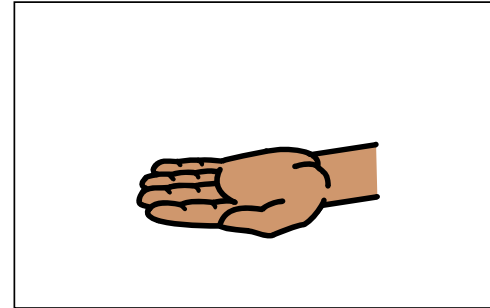
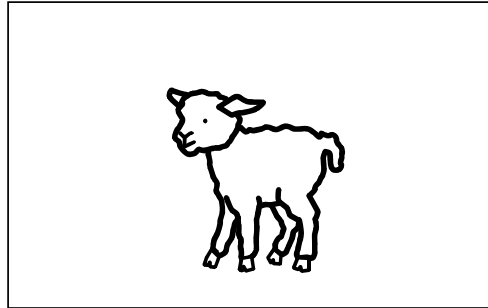
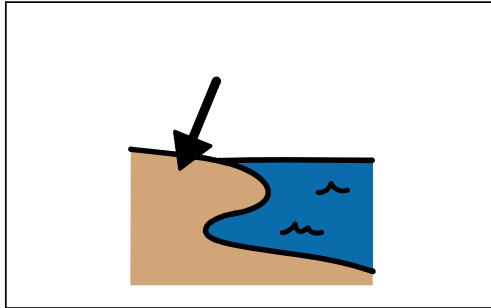
Place the odd one out in the bin



1. land/lamb/dam 2. ram/thumb/ham 3. yam/pram/fan

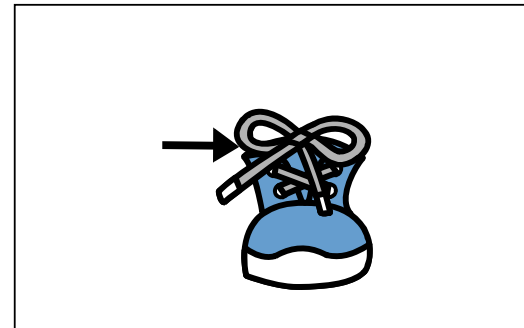
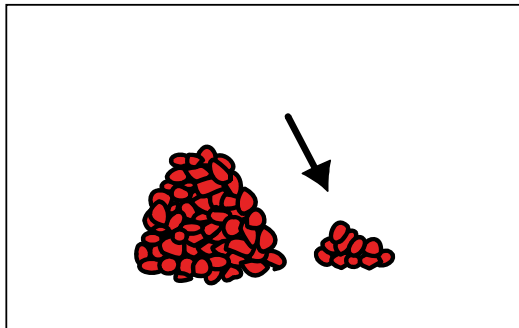
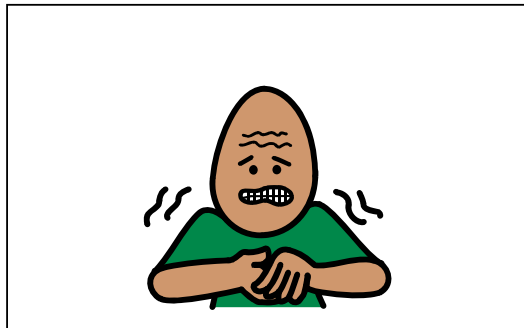
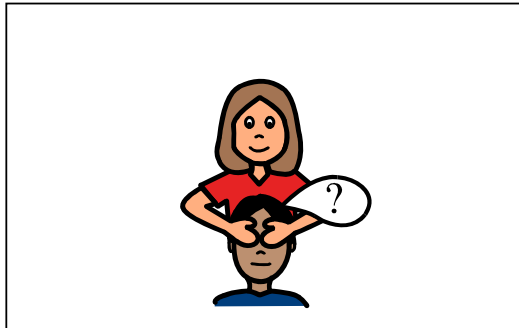
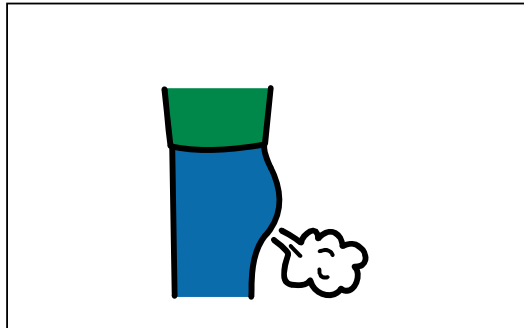
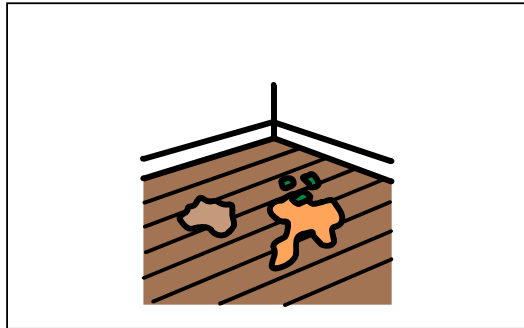
1. red/net/bed 2. head/sled/mad 3. feet/shed/bread

Place the odd one out in the bin



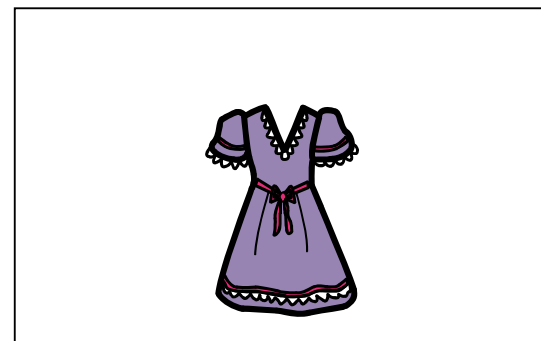
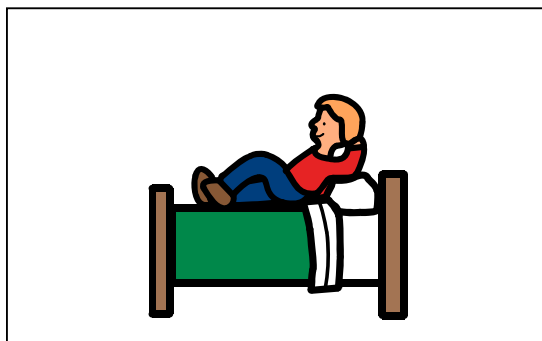
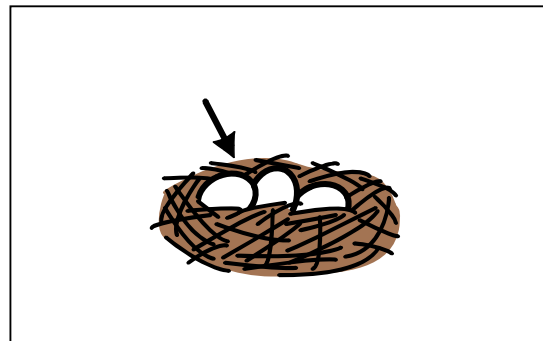
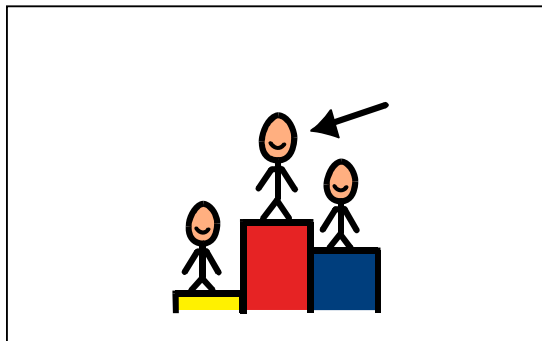
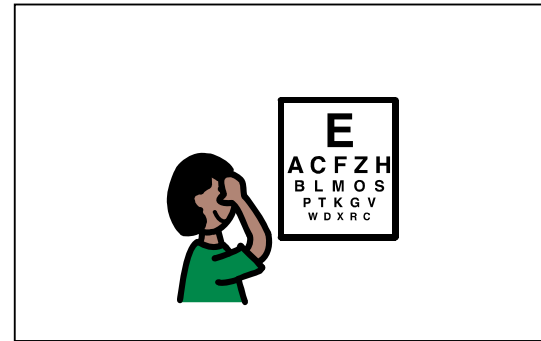
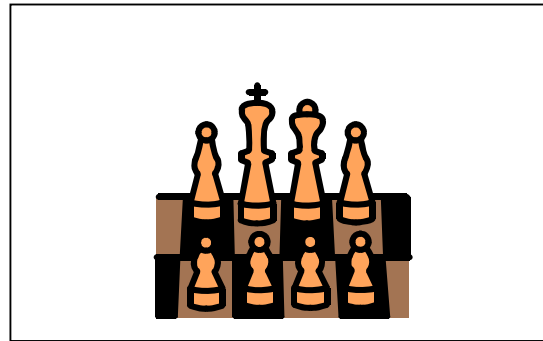
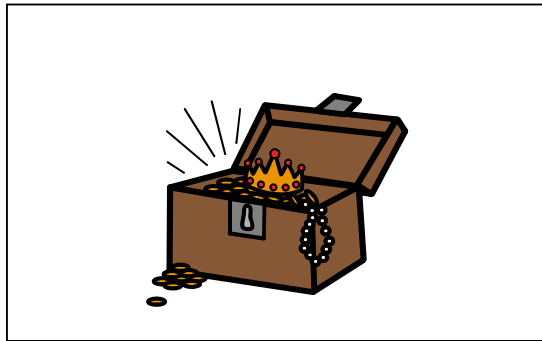
1. land/lamb/hand 2. ram/sand/stand 3. band/brand/can

Place the odd one out in the bin



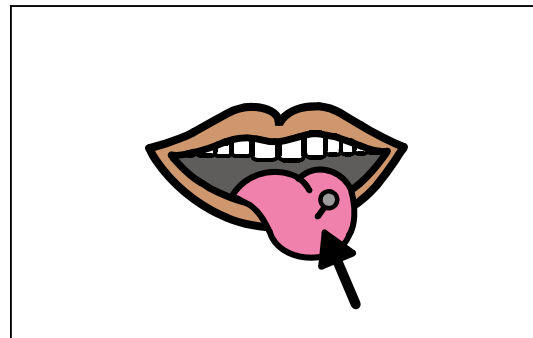
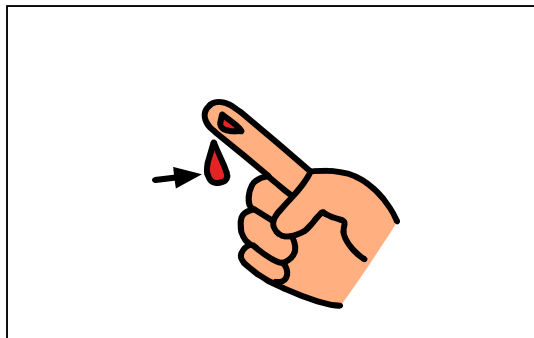
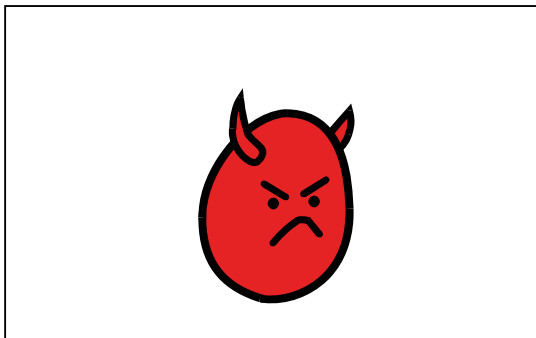
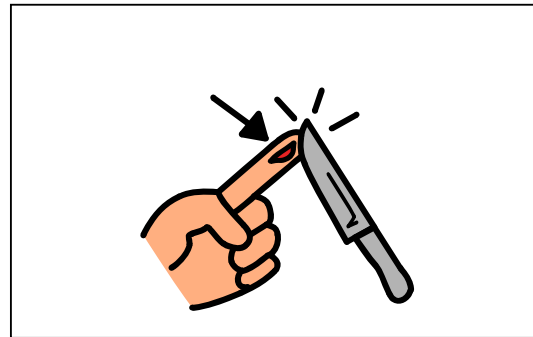
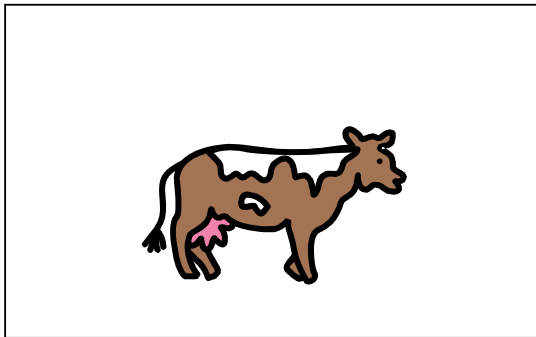
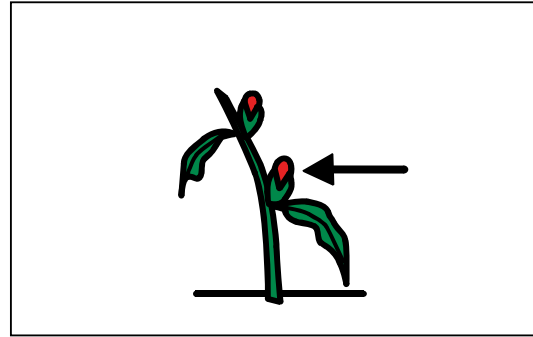
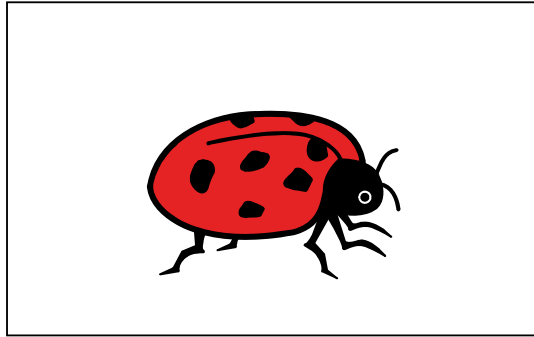
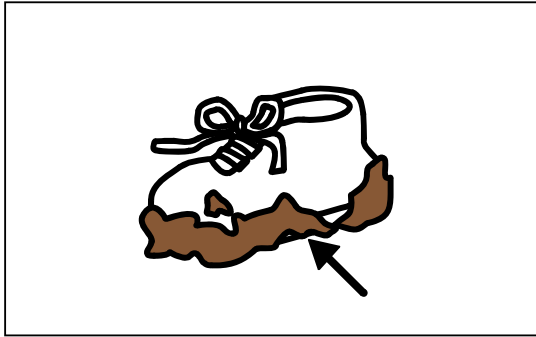
mess, men, tess / gas, guess, dress, / stress, less, lace

Place the odd one out in the bin



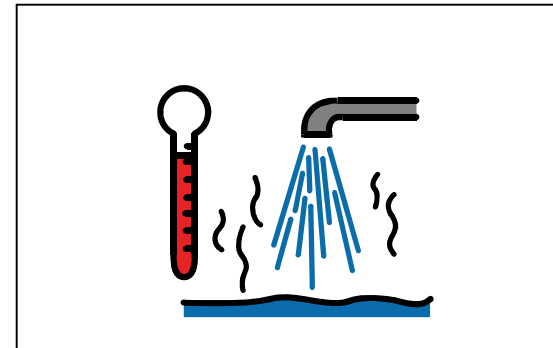
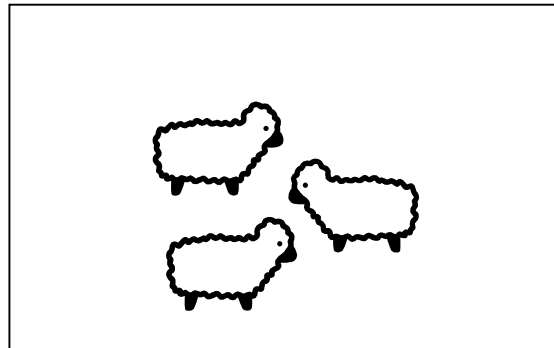
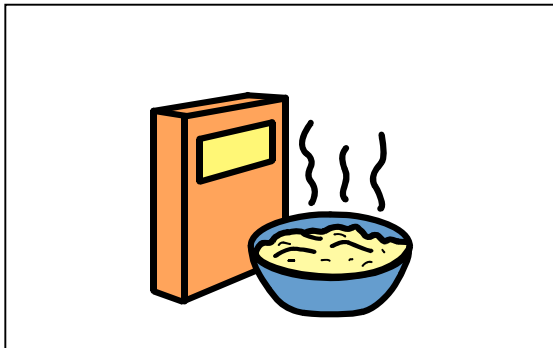
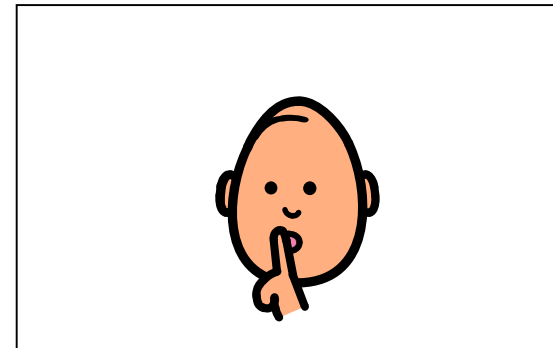
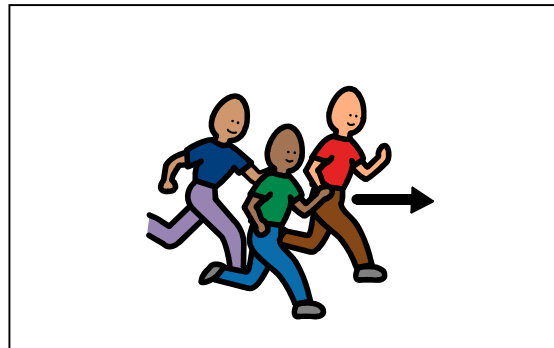
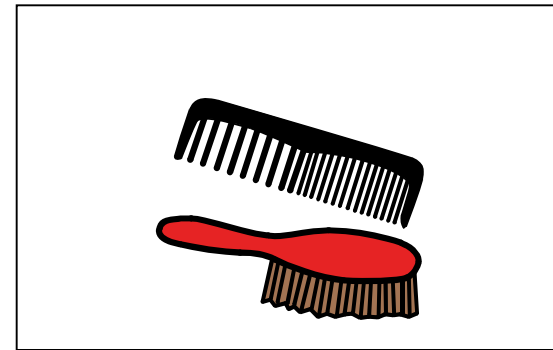
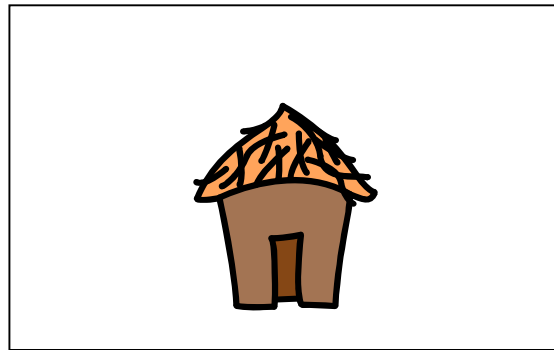
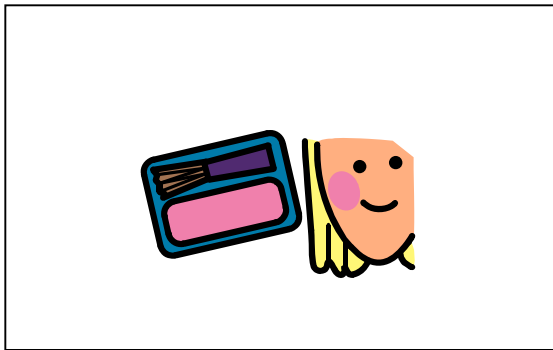
1. chest/chess/test 2. best/nest/wet 3. rest/pest/dress

Place the odd one out in the bin



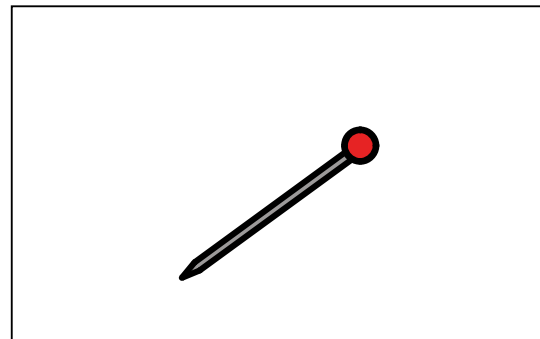
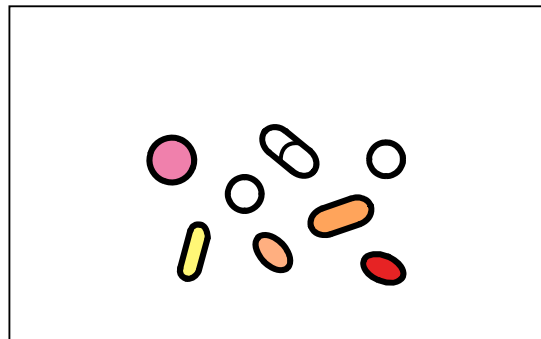
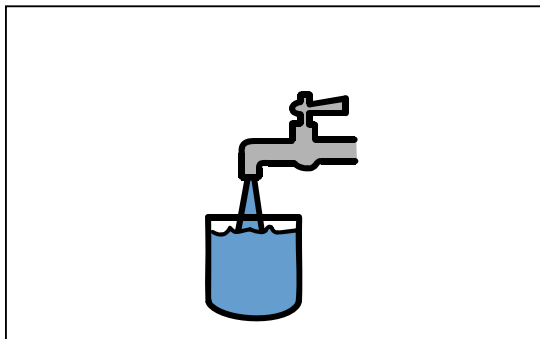
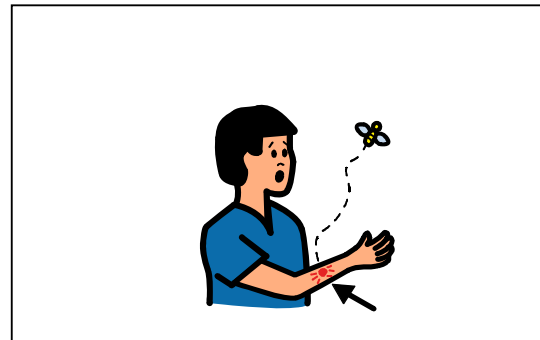
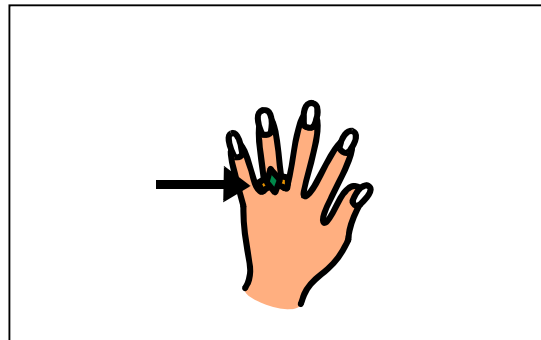
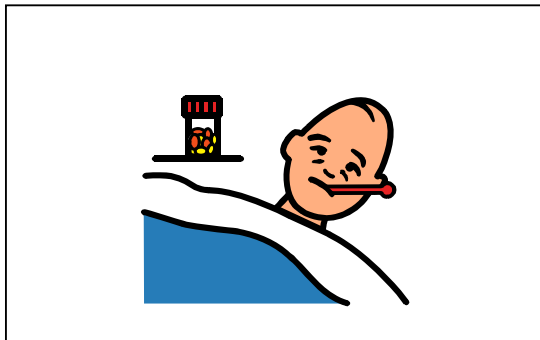
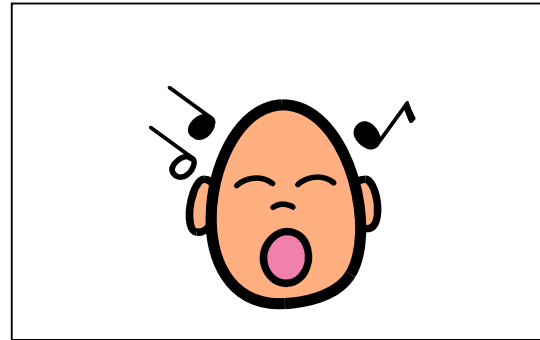
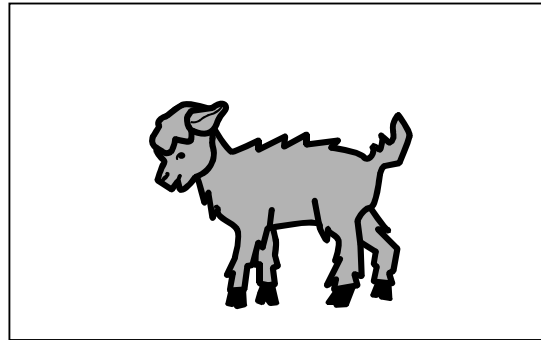
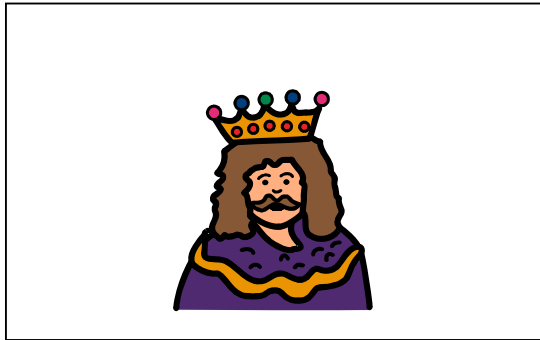
1. mud/bug/bud 2. cud/thud/cut 3. bad/blood/stud

Place the odd one out in the bin



blush/hut/brush, put/rush/hush / mush/sheep/gush

Place the odd one out in the bin



1. king/kid/sing 2. sick/ring/sting 3. fill/pill/pin

Appendix 6

Sequence of teaching the rime units across the 10 lessons and times recorded.

Table 4

Lesson	Student A (time in seconds)	Student C	Student B
1. at	35	28	62
ip	44	40	41
2. ack	27	26	34
ell	25	16	18
3 onsets plus 4 rimes (at/ip/ack/ell)	75 secs	23	55
3. ot		9	19
ug		7	10
3 onsets plus 4 rimes (ot/ug/ack/ell) Total = 12 words	CR = 2 CLL = CS = 2 SC = 1 COR = 7 IC =	22secs CR = 10 CLL = CS = 1 SC = 1 COR = IC =	37secs CR = 4 CLL = 3* CS = SC = COR = 4 IC = 1*
4. ed + 2 ccvc	22	11	33 ped/sed/tred
ag + 2 ccvc	23	9	40*
3 onsets plus 4 rimes (ot/ug/ed/ag)	105	28	107
5. ad + 2 ccvc	21 (y)	10	19
ig + 2 ccvc	43 (y, s-inserted l)	9	27 (s inserted l)
3 onsets plus 4 rimes (ig/ad/ed/ag)	86	34 (90% COR)	64
6. ob	31 ob/og confusion	11	18
og	25 (y –improved)	16 ob/og conf	38 d/b & ob/og confusion
3 onsets plus 4 rimes (ad/ig/og/ob)	CR = 2 CLL = CS = 4 SC = 2 COR = 2 IC =2 107	CR = 11 CLL = CS = SC =1 COR = IC = 18	CR = 1 CLL =3 CS = 5 SC =1 COR = IC =2 84Highly distracted
7. ing	14	14	10
ill	15	14	13
3 onsets plus 4 rimes (at/ip/ack/ell)	43	12	52
8. ud	PA – prompting 16	8	PA – prompting 18 ud/ug/ub confusion
am	13 am/um confusion	7	

			23 an/am confusion
3 onsets plus 4 rimes (ill,ing,ud,am))	58 am/ud diff COR	24	38 COR
9. ush ess	PA prompts br/b (bush) inserts r 33 16	9 bush 6	PA prompts 27 ess(inserted est on nonsense words) 34 ush/uss/ust confusion.
3 onsets plus 4 rimes (am/ud/ush/ess)	CR = 8 CLL = CS = SC = 1 COR = 3 IC = 33 COR on 1 st word then CR for same rime	CR = 7 CLL = CS = SC = 1 COR = 4 IC = 34 (inserting l)	CR = 5 CLL = CS = SC = 5 (OR –wrong rime when 1 st introduced. COR = IC = 2 61 Prompted - ush
10. and est	12 24	7 8	
3 onsets plus 4 rimes (ush/ess/and/est)	26	20	

How words are read key;

CR = Correct and rapid

CS = Correct and slow

COR = Correct after segmenting into onset-rime

CLL = Correct after letter by letter recoding

SC = self corrected

IC = incorrect

- = pseudowords

Table 5: Students' articulation and reflections on the learning

	Student A	Student B	Student C
Lesson 1 OOO	V	I	V
SR	I	DK	V
Lesson 4 OOO	A	I	A
SR	V	V	V
Lesson 7 OOO	V	A	A
SR	A	V	A
Lesson 10 OOO	A	A	A
SR	A	A	A

Key:

OOO = Odd one out task

SR = Self reflection

A = accurate

I = inaccurate

V = vague

DK = don't know