



The use of ubiquitous bottle caps as concrete aids to learn to read and spell for struggling readers

Ong Puay Hoon^{1*}, Ong Puay Tee², Ong Puay Liu³, Carol Persad⁴,
Wallace Lee Boon Liang⁵ and Alban @ William John Lisen⁶

1 Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak

2 Faculty of Business, Malaysia Multimedia University, Melaka

3 Institute of Ethnic Studies, Universiti Kebangsaan Malaysia, Bangi, Selangor

4 Centre for Development of Language & Literacy, University of Michigan

5 Dyslexia Association of Sarawak, Kuching, Sarawak

6 Laksamana Primary School, Kuching, Sarawak

Abstract

Humans were never born to read (Wolf, 2008), and yet the ability to read has become a critical skill to lead a functional life in the modern society. Children with dyslexia and other learning disabilities often struggle to learn to read due to the differences in brain neurology or function (Shaywitz, 2005). There have been various evidences that children with learning difficulties learn best through multisensory activities (Logsdon, 2014).

This paper describes the use of ubiquitous bottle caps as concrete learning aids to read and spell CVC (C – consonant, V – vowel) words in English by struggling readers attending remedial education in their primary schools. The project took place during a summer camp, in Malaysia and progress was followed up 2 months after the camp had finished. Significant improvements were found and these improvements were maintained after the intervention finished. The impact of the use of this learning tool in a literacy camp with 13 struggling readers will be discussed.

* Correspondence to:

Ong Puay Hoon, Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak, email: ophoon@yahoo.com

Introduction

Humans were never born to read (Wolf, 2008), and yet the ability to read has become a critical skill to lead a functional life in the modern society. The UNESCO-led 'Education for All' movement, launched in 1990, is a global commitment (including by Malaysia) to provide quality basic education for all children, youth and adults (UNESCO, 2014). All children, regardless of who they are, where they come from, where they live and whether they have or have no disabilities, have a right to quality education that provides them with literacy and/or vocational skills so as to be skilled or professional human capital in the future.

In Malaysia, the issue of students who dropped out of school due to various reasons including economic factors, home background, teacher factors or poor literacy and numeracy skills has existed since the early formulation of the Malaysian education system and became more critical in the 1960's (Murad, 1972). Between 1956 to 1970, more than 40% of primary school students dropped out without joining any secondary schools (UNESCO, 1973). The National Education Blueprint 2006-2010 (MOE Malaysia, 2006, p. 28) reports that for the 1999-2004 cohort of primary school students, drop-out rates were 1.9% for urban and 1.2% for rural schools. Among secondary students of the 2000-2004 cohort, 9.3% in urban and 16.7% in rural schools have dropped out without completion of their secondary school education. Recently, the National Education Blueprint 2013-2020 reports that out of 509,329 students in Primary 1 in 2000, 8% of them (40,747 students) did not complete Form 5 secondary education. A

total of 142,612 of this cohort failed at least one core subject (Bahasa Malaysia, English, Mathematics, Science, History, Moral/Islamic Education) in the Form 5 national examination, thus failing to achieve the minimum academic standard. Similar trends were observed in the earlier cohort of Primary 1 students in 1999 (MOE Malaysia, 2013).

Initial difficulties in learning to read and write can condemn a child to failure in school and possible early abandonment of education. The Cabinet Committee then declared for primary education to emphasise on mastering the basic skills of reading, 'riting, and 'rithmetic (3Rs) (Cabinet Report, 1979). The National Education Blueprint 2006-2010 (MOE Malaysia, 2006) states that in the year 2004, there were more than 115,000 students (7.7%) in Primary 1-3 who had not mastered the basic 3R's - reading, writing and arithmetic. For the year 2005, 4.4% of primary school students had not acquired these basic literacy skills. Later research reports that 80,000 primary school children had problems in the acquisition of basic skills, which include reading (Rahil & Habibah, 2008). A study undertaken in conjunction with the Educational mandate called National Key Result Area (NKRA) found that as many as 14% (54,000) Primary 1 students had not mastered the 2R's skills of reading and writing (Norliza Zakuan, 2010). Many of these students remained unable to read, write and do mathematics when they entered Primary 4. This data also showed that students who had not acquired these basic literacy skills contributed to an increase in dropout rate from school besides increasing cases of indiscipline. Children with learning difficulties seem to

have their primary difficulties rooted in learning to read. Lyon (1996) estimated this percentage to be as much as 80%.

As many students still do not master these skills, the Ministry of Education (MOE) Malaysia introduced the Early Intervention Reading and Writing Class (KIA2M) program in 2006 that identifies children with reading and writing difficulties in the first year of primary education and provides them with additional intensive tutoring by teachers trained in special education. In 2010, through the NKRA Educational mandate, the MOE implemented the Literacy and Numeracy Screening (LINUS) program that aims to ensure that each student will master the basic skills after the first three years of primary education (Norliza Zakuan, 2010).

Children with dyslexia and other learning disabilities often struggle to learn to read due to the differences in brain neurology or function (Shaywitz, 2005). As these children have a right to quality education that will enable them to read and write, it is essential that appropriate and effective methods are used by teachers in cognizance of their learning styles and capabilities that are different from other typical children. Anecdotal evidence from observations of remedial classes in schools and conversations with both teachers and parents show that many teachers employ the same methods to teach children with learning disabilities as with their other typical students, albeit in smaller groups and higher intensity. Needless to say, as such methods have not worked for learning-disabled students while they were in mainstream classes, surely they will not work even when they are in smaller remedial classes. Instead,

the ineffectiveness of these methods compounds the feelings of failure and frustration among these children.

Use of a physical and manipulative tool as aid to learn to read

There has been a range of evidence indicating that children with learning difficulties learn best through multisensory activities (Logsdon, 2014). The use of caps of mineral and drinking water bottles as a physical aid might be effective for many children with dyslexia and other learning disabilities as they allow easy and convenient manipulation to sequence letters, form or segment syllables, construct words and practice activities on word building, phonemic segmentation and auditory processing. In addition, they are very easily available in various colours, at no cost and are very light and easily packed to be carried by the children and easily kept in the classroom.

A permanent red marker pen is used to write the letters in small caps on the tops of the bottle caps. While light-colored bottle caps (for example, light blue or green) are used for the vowels *a, e, i, o, u*, white-colored caps are used for the consonants (the reason being that white caps are more easily obtained).

Structure of syllabus for reading instruction using the bottle caps

Step 1: The first session commenced with the cap arrangement into the alphabet series using the modified ABC song – *abcd efg hij klm nop qrs tuv wxyz* – with shorter segments and where *m* and *n* are separated into different segments.

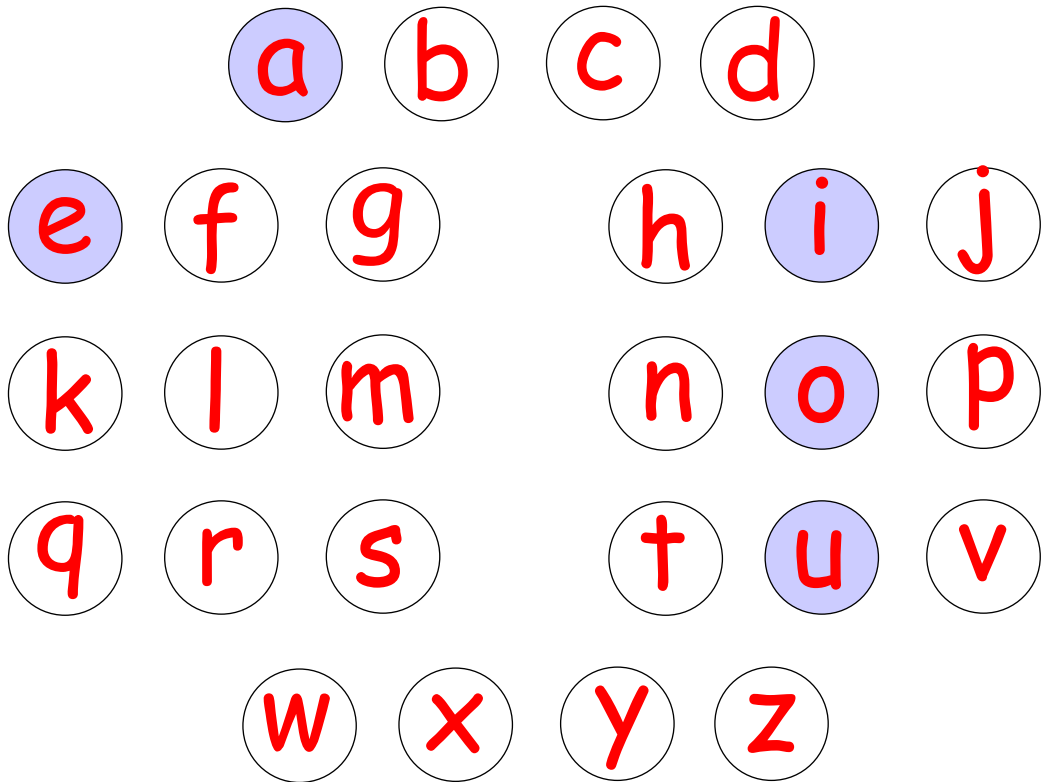


Figure 1. Bottle cap arrangement for step 1

Compare this with the regular ABC song, taught right from kindergarten -

abcdefghijklmnop qrstu and v wxyz. There is a definite tendency for students, especially for those with learning disabilities, to 'drop' one of the pairs of similar-sounding letters like *j* or *k*, *m* or *n*, or to forget parts of the lengthy segments or think that the 'and' in the song is for another letter. The repeated singing of the ABC song attempts to commit to sheer memorization of the alphabet series and this will be successful for typical children. However for children with dyslexia who have difficulties in working memory, this method might not be effective. The

arrangement of bottle caps while singing the modified ABC song brings together tactile, visual and auditory components for meaningful memorization. In addition, children with dyslexia are often confused with directionality of letters of similar shapes like *b-d-p-q*, *m-w*, *m-n* and *u-n*. Use of bottle caps allows them to turn or rotate the caps while trying to figure them out.

Step 2: Upon mastery of the alphabet series, the sounds for the first set of 10 letters, *a b c f h m p r s t*, are introduced. Caps of letters outside this set are kept aside.

Step 3: After mastery of these letter sounds in Set 1, blending of CV is introduced. Students practiced forming and reading the CV syllables, where V is a, with the caps. The syllables are *ba, ca, fa, ha, ma, pa, ra, sa* and *ta*. Set 1 of four sight words - *and, the, on, is* - is introduced using flash cards.

Step 4: After mastery of these syllables, CVC word building with Set 1 letters is then introduced, where words such as *bat, cat, fat, hat, mat, pat, rat, sat, tap, tab, tac, fab, ham, has* can be formed. Phonemic segmentation and auditory processing activities are done with these words to increase understanding and mastery. Examples include:

- a. Form *cat*. What do you do to change *cat* to *hat*? Student changes cap *c* with cap *h*.
- b. Now, change *hat* to *has*. The cap *t* is removed and replaced with cap *s*.

Set 2 of four sight words - *a, this, has, it* - is introduced using flash cards. Short sentences are then introduced. Some examples include:

The cat is fat.
The cat sat on the mat.
The cat and the rat sat on the mat.
This is a hat. It is on Pat.

Step 5: After mastery of Set 1 letters and Sets 1-2 sight words, the letter sound for vowel o is then introduced as Set 2. The combination of 11 letters in Sets 1 and 2 forms new CVC words like *hot, pot, cot, tom, etc.* Phonemic segmentation and auditory processing activities are done using the bottle caps together with reading and spelling activities. Set 3 of

three sight words - *have, I, you* - is introduced. Examples of short sentences introduced are:

This is a pot. It is hot. This is a cot.
I have a mop.
You have a hot pot.
This is a tap.

Step 6: After mastery of CVC words from Sets 1-2 letters and Sets 1-3 sight words, letter sounds of Set 3 - *i u d g j* - are introduced. Examples of new CVC words from the combination of 16 letters in Sets 1-3 include *bug, bun, dig, wig, cup, sit*. Again, bottle caps are used in the phonemic segmentation and auditory processing activities for these CVC words. Set 4 sight words - *play, with, we* - is introduced, together with the following examples of short sentences:

A bug. This is a big bug.
I play with big bug.
We have a cup.
Big bug sat on jug.

Step 7: Upon mastery of CVC words in both reading and spelling from Sets 1-3 letters and Sets 1-4 sight words, the letter sounds of the final Set 4 is introduced - *d e k l n v w z*. New words include *dug, dig, Ken, lot, wet, nut, etc.* Set 5 sight words - *at, look, me, come* - are introduced using flash cards, together with the following short sentences:

Big Ben plays with a hat.
You and I play with the cat.
Look! The hat is wet. The mat is wet.
Come and play with the bug. It is fun.

Appendix 1 shows the use of the bottle

caps and Appendix 2 displays the syllabus of the above reading instruction program.

Results

The above syllabus was employed in a 6-day literacy camp for 13 struggling readers from six different primary schools. The students were named as A to M and were average age 9 years. Students E and F were females while the rest were males, giving a male: female ratio of struggling readers in the camp as 11:2 or approximately 5:1. The bottle caps were used as manipulative tools in a highly structured and cumulative manner. The students' reading ability was tested in a pre-test, progressive test, post-test (at the end of the camp) and a re-assessment two months after the camp.

Figure 2 shows the number of sight words read correctly in one minute in the four tests. In all the students except E, the number of sight words read correctly increased at different incremental rates from pre-test to progressive test and to post-test. For the re-assessment after two months of the camp, the number of sight words read correctly increased or remained constant from that of the post-test for eight of the 13 students ($\approx 62\%$). For the five students who showed a reduction from post-test to re-assessment, the number of sight words read correctly during the re-assessment is still higher than that of the pre-test for each child. Student K started out without being able to read a single sight word in the pre-test, but after the reading program, he showed a steady increase from the progressive test onwards.

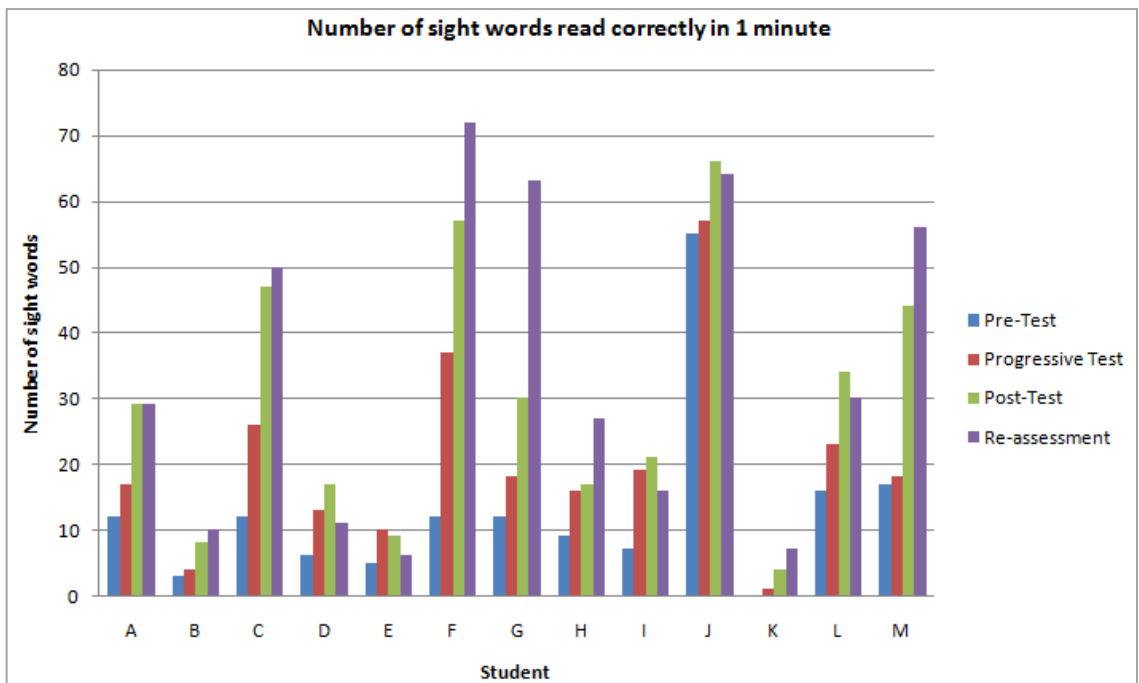


Figure 2 Number of sight words read correctly

A Wilcoxon Paired Signed-Rank Test showed that the increases in the number of sight words read correctly in one minute was significant between the post- and pre-tests ($Z = -3.183, p < 0.05$) and re-assessment after two months and pre-test ($Z = -3.071, p < 0.05$).

Figure 3 shows the percent increase in the number of sight words read correctly in one minute during the re-assessment conducted two months after the camp with that from the pre-test. While all students registered increase, dramatic increase of 100% and more was shown by nine of the students ($\approx 69\%$).

Figure 4 shows the number of CVC words read correctly in one minute in the four tests. With the exception of C, E and K, the rest of the ten students exhibited

increased or maintained constant the number of CVC words read correctly from pre-test to progressive and post-tests ($\approx 77\%$). For the re-assessment after two months of the camp, learning seemed generally stable - four students showed increments in the number of CVC words read correctly while the others showed a slight decrease. With the exception of K, the scores at the end of two months for the rest of the students were higher than that obtained from the post-test.

A Wilcoxon Paired Signed-Rank Test in SPSS showed that the increases in the number of CVC words read correctly in one minute are significant between the post- and pre-tests ($Z = -3.115, p < 0.05$) and re-assessment after two months and pre-test ($Z = -3.062, p < 0.05$).

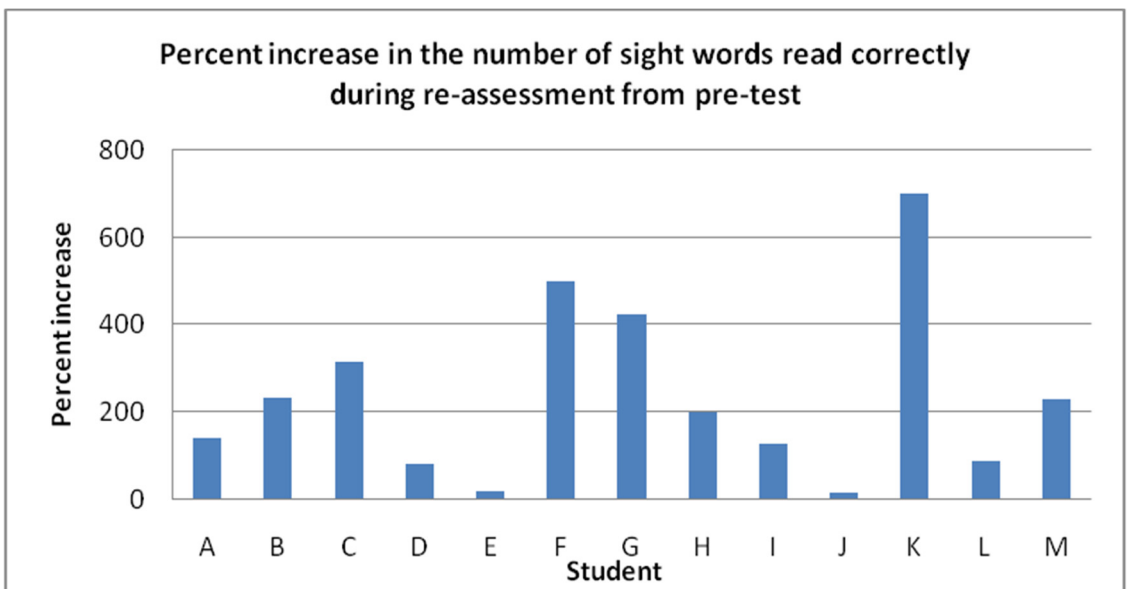


Figure 3 Percent increase in the number of sight words read correctly from pre-test to re-assessment (done two months after the camp)

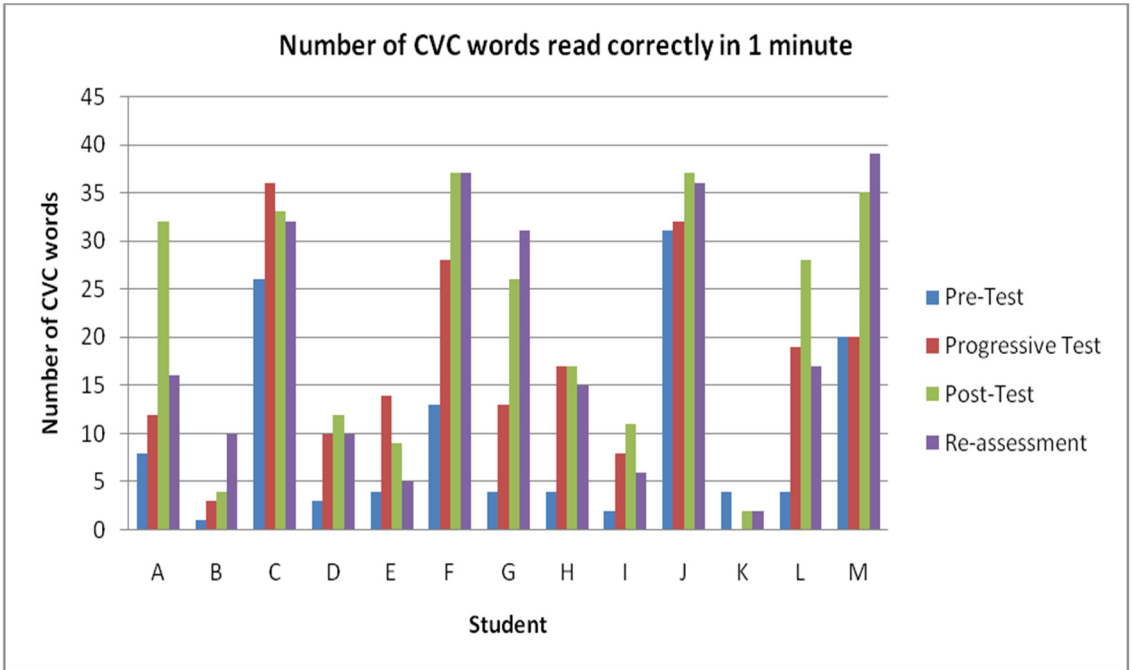


Figure 4 Number of CVC words read correctly in one minute

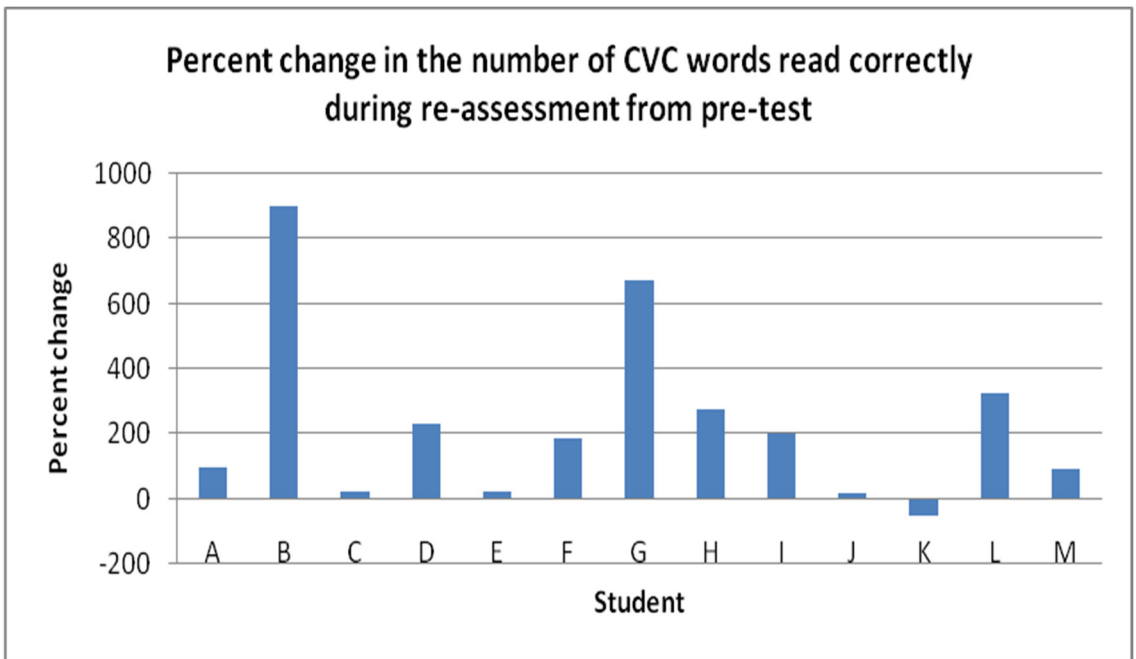


Figure 5 Percent change in the number of CVC words read correctly from pre-test to re-assessment (done two months after the camp)

Figure 45 shows the percent increase or decrease in the number of CVC words read correctly during re-assessment two months after the camp with that from the pre-test. Only student K registered a 50% reduction while the rest of the 12 students showed different percentages of increase.

Discussion and Conclusion

The reading ability of this group of 13 struggling readers, both in terms of sight words and CVC words, has generally improved after the literacy camp where the reading instruction program was conducted in a structured and cumulative manner and where bottle caps were used as manipulative aids in letter recognition, word building, phonemic segmentation and auditory processing. This ability to read sight and CVC words seemed rather stable, even after two months. It is highly probable that the students have somewhat gained a sense of decoding, that is, making a clear connection between the grapheme and phoneme of the alphabet series for English. Without acquisition of this decoding skill, learning would be temporary.

It is often easier to improve the skills of children who have already made some progress in reading. Interestingly, however, children who were very low achieving made striking improvements in their ability with the use of this easily available technique. It should also be noted that the improvements made were striking, with one child (G) reading only 10 words at pre-test and achieving over 70 at the delayed post-test. If we consider the z scores achieved, which are equivalent to effect sizes, an effect size of 0.2 in interventions is deemed small, 0.5

moderate and 0.8 and over high. Note that the immediate impact of the intervention was z score 3.2 and the delayed effect 3.1 for sight words, whereas CVC words were almost equivalent at 3.1 for both times of testing. This indicates an extremely high effect size on all conditions at all times of testing.

This reading instruction program has shown that teaching strategies that use multi-sensorial activities and physical learning aids such as the ubiquitous bottle caps can be effective to guide struggling readers to learn to read and write. Further research should be done to gather more concrete evidence of the use of bottle caps by conducting a case-control study design.

The implications of this research for countries where facilities for support are limited can be particularly encouraging. This suggests that free, easily available materials such as this can begin to change the educational outlook for children at risk across the region, even where continued specialist support may always be available. With the provision of early intervention and specialist support, these figures could be extended to many more children with problems in learning to read.

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APPENDIX 1—Use of Bottle caps to read and spell in Malay language by a young struggling reader.



APPENDIX 2—Syllabus of Reading Instruction Program using bottle caps as a learning aid

STEP	LEARNING OUTCOMES	ACTIVITIES	MATERIALS
1	Alphabet series	ABC song Sequencing of alphabet series with bottle caps	ABC cards Bottle caps
2	Set 1 Letter sounds	Matching animals with their sounds Matching Set 1 letters with their sounds <i>a, b, c, f, h, m, p, r, s, t</i>	Picture cards of animals Bottle caps
3	CV syllables from Set 1 letters Set 1 sight words	Blending and reading of CV syllables from Set 1 letters - <i>ba, ca, fa, ha, ma, pa, ra, sa</i> and <i>ta</i> Reading of Set 1 sight words - <i>and, the, on, is</i>	Bottle caps Flash cards
4	CVC word building from Set 1 letters Set 2 sight words Set 1 short sentences	CVC word building with Set 1 letters - <i>bat, cat, fat, hat, mat, pat, rat, sat, tap, tab, tac, fab, ham</i> Phonemic segmentation and auditory processing activities Review of Set 1 and reading of Set 2 sight words - <i>a, this, has, it</i> Reading of short sentences: <i>The cat is fat. The cat sat on the mat. The cat and the rat sat on the mat. This is a hat. It is on Pat.</i>	Bottle caps Flash cards
5	Set 2 letter sound CVC word building from Sets 1-2 letters Set 3 sight words Set 2 short sentences	Review of Set 1 letter sounds and introduction of letter sound for <i>o</i> as Set 2. CVC word building with Sets 1 and 2 letters - <i>hot, pot, cot, tom, top, etc.</i> Phonemic segmentation and auditory processing activities Review of Sets 1-2 and reading of Set 3 sight words - <i>have, I, you,</i> Review of Set 1 and reading of Set 2 short sentences: <i>This is a pot. It is hot. This is a cot. I have a mop. You have a hot pot. This is a tap.</i>	Bottle caps Flash cards
6	Set 3 letter sounds CVC word building from Sets 1-3 letters Set 4 sight words Set 3 short sentences	Review of Sets 1-2 letter sounds and introduction of letter sounds for Set 3 - <i>i u d g j</i> . CVC word building with Sets 1-3 letters - <i>bug, bun, dig, wig, cup, sit, etc.</i> Phonemic segmentation and auditory processing activities Review of Sets 1-3 and reading of Set 4 sight words - <i>play, with, we.</i> Review of Sets 1-2 and reading of Set 3 short sentences: <i>A bug. This is a big bug. I play with big bug. We have a cup. Big bug sat on jug.</i>	Bottle caps Flash cards
7	Set 4 letter sounds CVC word building from Sets 1-4 letters Set 5 sight words Set 4 short sentences	Review of Sets 1-3 letter sounds and introduction of letter sounds for Set 4 - <i>d e k l n v w z</i> . CVC word building with Sets 1-3 letters - <i>dug, dig, Ken, lot, wet, nut, etc.</i> Review of Sets 1-4 and reading of Set 5 sight words - <i>at, look, me, come.</i> Review of Sets 1-3 and reading of Set 4 short sentences: <i>Big Ben plays with a hat. You and I play with the cat. Look! The hat is wet. The mat is wet. Come and play with the bug. It is fun.</i>	Bottle caps Flash cards