The Effect of Using Computer Literate Game in
the Teaching of Reading Literacy Skills in Zambia

Grace Mulenga Kachenga
Master's thesis of Psychology
University of Jyväskylä
Department of Psychology
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ABSTRACT
Author: Grace Mulenga Kachenga

Supervisor: Heikki Lyytinen

Master's Thesis of Psychology, University of Jyväskylä, Department of Psychology

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The key to understanding how reading skills develops, is to comprehend how beginners learn to recognise written words accurately and automatically. Word reading requires conscious attention and focus on phonemes. Reading is an imperative academic skill and is a foundation for all school learning.

Learning to read must normally be preceded by a background of meaningful articulate and clear use of language, at home and school. In Zambia, children learn their mother tongue (first language) at home. There are 73 languages in Zambia and only 7 of these are used as medium of instruction in Basic Schools. In addition, English is also used as an instructional language and is the official language of Zambia. As such, children are required to learn English as a second language in school.

English is highly regarded as an opaque language that has inconsistent orthography. Studies confirm that learning to read is easier in transparent languages like Finnish, than in opaque languages like English. The general models for reading acquisition made for English language can not be universally adapted to other languages. It is for this reason that methods of literacy teaching should be developed according to the alphabet code of the language in use.

For quite sometime now, Zambia has been concerned with unsatisfactory levels of reading ability among Basic School children. As a result, a number of studies were initiated to look into reading problems in Basic Schools.

In this study, 60 children from grade 3 and 4 with poor reading skills were randomly selected. 30 (intervention group) played the computer literate game in English, and another 30 (control group) continued with school instruction. The grade 3 had a back ground of literacy skills learning in the local language (Cinyanja) whilst the grade 4 had the literacy skills learning straight in English. Their learning process were recorded by the computer and the assessment results were analysed in detail between the control and intervention groups, with the sole purpose of finding the possible explanations for difficulties encountered in reading acquisition.

The results indicate that, using the computer for teaching literacy skills proved to be effective. This can be seen from the performance results of the grade 3. The 3 hours of training was enough to improve the English literacy skills on the grade 3 but not on the Grade 4.

There is need to have further research in methodology of teaching literacy skills to children at the Basic school level, if they are to acquire better literacy levels and have a country that will excel in English literacy skills.

Key words: Computer games, Literate game, literacy, phoneme, curriculum, Zambia.

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1. INTRODUCTION

Reading is essential to success in our society. The ability to read is highly valued and important for social and economic advancement. The question of why some children have difficulty in learning to read has been the focus of a great deal of research over the past years and much has been learned about the probable and improbable causes of such difficulty (Lyon, Fletcher, & Barnes, 2000). Reading is undoubtedly the most important academic skill and is a basis for all school based learning. A child's success throughout formal education largely depends on the ability to read.

For quite sometime now, Zambia has been concerned with unsatisfactory levels of reading ability among primary school pupils in both English and Zambian Languages. In Zambia, there are 73 languages. Only 7 of these are used as a medium of instruction in the lower grades. English is used as the official language in Zambia. In grade 1, Children are expected to learn to read in the local language commonly spoken in the area. In grade 2, a combination of English and the local language are used up to grade 4 (Mweembe, 2000). In grade 5 the medium of instruction is only English up to grade 7, while the local language comes as a lesson on its own on the time table. Reading and writing in local language is taught during this lesson. The remaining subjects are taught in English. The local language is tested at the Primary Grade 7 final leaving examinations before students proceed to grade 8. This system is rather challenging and confusing. As a result, learning outcomes have been poor in both language systems. Hence a number of studies were initiated to look into the reading problem in primary schools.

Like many countries in Africa, Zambia has the educational challenge of teaching reading in two different alphabet codes. The alphabet is a writing system based on phonemes (speech sounds, ie. individual consonants and vowels). The new approach that focuses on impact of language has been introduced. The current (Zambian) curriculum puts pressure on grade 1 children who are expected to learn to read and write in highly consistent orthography (standardized spelling) of the Zambian language perfectly well, and are expected to transfer their understanding to English literacy. English is an opaque (irregular, inconsistent) system fundamentally different from Zambian Languages. The Zambian child is expected to begin school at the age of seven in public schools, although the starting

age may differ in the private schools. The children come with different language backgrounds depending on which language they use as mother tongue. For example Cinyanja, Citonga, Icibemba or Silozi just to mention a few. Once a child begins school, he or she is expected to learn in a language spoken in the local community. This disadvantages those children whose mother tongue is different from the one that is used at school. Sometimes the children are expected to learn a whole new language spoken at school. Fortunately, all Zambian Language's have some alphabetic code, but the greatest challenge is to transfer it from Local Language to English.

This kind of education system is different from European countries. For example in Finland, the beginning age for school is same as in Zambia, but the whole school system is in Finnish. English lessons start in grade three and it is only taught in language lessons. All the other learning materials are provided in Finnish. English materials are read at the higher level of education. All the media is also in Finnish. English movies and TV series are subtitled in Finnish. Despite a few number of English lessons, most Finns speak good English and are able to manage with it abroad. This is because knowing one's mother language well is essential for learning other languages. Finnish is structurally easy and an example of an almost purely phonemic alphabet orthography (Aro, 2005). Zambian Languages are almost as transparent and consistent as Finnish, which is why research on Finnish reading skills is relevant to Zambia. If it is possible to learn to read and write fluently in English even when the medium of instruction is given in another, structurally completely different language (such as Finnish) the same methodology could also be utilized to improve Zambian children's chances to transfer literacy skills from local language to English.

Zambia is still trying to develop the best approach of teaching reading in its education system. Although many studies have been conducted, experimented and piloted in most schools, the Ministry of Education has not yet conclusively come up with one that can be regarded as being the best method. Children are still struggling to over come their reading difficulties (Kalindi, 2005) and are still having problems in reading (Kelly, 1995). In this study, an educative computer game is used to assist the poor readers to learn to read in English. The game is based on synthetic (phonemic) theories of reading instruction which have long been used in countries like Finland, but are not so well known in the English world. The phonics-based methods of teaching English literacy skills are becoming more popular with the new research, and the game used in this study is part of this new approach. This study

is an experiment on teaching English in a purely phonetic way, with the hope that the study could give new ideas on teaching English literacy in Zambia.

1.1 Teaching English in today's Zambia

During the 1980's and 1990's, it became increasingly evident that literacy standards among Zambian school learners were distressingly low. In 1995, the Ministry of Education convened a National Reading Forum to look into this problem. The findings and recommendations of this forum led to a radical change of policy regarding the teaching of literacy. The new policy states, "all pupils will be given an opportunity to learn initial basic skills of reading and writing in a local language" (Educating Our Future, 1993:39).

The Primary Reading Programme (PRP), located within the broader Basic Education Sub-Sector Investment Programme, (BESSIP), was then established with the mission to improve literacy levels among Zambian school learners. One of the early successes of the Primary Reading Programme was the production of the Zambia New Breakthrough to Literacy, a course aimed at introducing initial literacy at Grade 1 through the seven official Zambian languages. This course is now used in all primary schools.

The National Break Through to Literacy (NBTL), is a method and a course that help children learn to read fluently and write easily as well as accurately in their local language. Right from the start, the learners see in printed form those words that they use every day in their local language. The NBTL uses the language experience approach. It starts from what the learners know, for example, their spoken language and uses this to help them learn something new, how to read and write (New Breakthrough to Literacy, 2001). More information about the teaching of the Zambian Native Languages in the NBTL curriculum can be obtained from the reports by Ojanen (2007) and Kaoma (2008).

The Breakthrough to Literacy is currently used by the teachers in the teaching of reading. The Ministry has been looking forward to the improved literacy levels in our schools and to better oral competence in English, following the implementation of these integrated courses. The Ministry of Education expects that, by starting literacy teaching in local language, also English Literacy will be more easily reached.

The recent success of this programme includes the following:

- Step In To English, a literacy course for English in Grade 2,
- Pathway to English, Teacher's guide for oral competence in English in Grades 1 and 2;
- Read On, a literacy handbook for Grades 3 to 7. This handbook assists teachers in taking all learners to a level of literacy that enables effective learning across the curriculum.

Various experts from the Ministry of Education and the University of Zambia have made important contributions towards the development of these materials. All courses have gone through a rigorous process of piloting, monitoring and evaluation to ensure quality and success (MoE, 2002). This study reviews the impact of the current curriculum on children in Grades 3 and 4 and thus adds to the evaluation of the curriculum's effectiveness.

1.2   Results of the current curriculum

The Curriculum Development Centre (CDC) has been heavily involved in finding a solution to the declining literacy levels in our education system, which is a direct result of improper language policy (Mweembe, 2000). Mweembe, (2000) reports of studies, which confirmed that proper and effective learning can only take place if it is delivered through the mother tongue. The monitoring reports in the MoE have shown that pupils who learned their initial literacy through the local language are able to read fluently in both Zambian Languages and English (MoE, 2002). This method of learning starts from known to unknown and from simple to complex. Therefore, in most learning scenarios, mother tongue is a very familiar language and structurally easier than English or any other language. This can also be referred to the research done by Geva & Siegel (2000) who studied 245 Canadian children who were learning to read and write English and Hebrew at the same time. English was the first language in most cases. Hebrew has consonant symbols and diacritics which are nearly 100 % consistent, making Hebrew a highly transparent writing system. By the end of first grade, the children scored 79 % on a Hebrew reading test, but only 44 % on the English version of the test. This indicates that learning to read in a transparent code is easier, even when the transparent language was not the child's mother tongue.

A Zambian evaluation study tested 500 Grade 2 pupils from the NBTL classes who got the following average results: Dictation- 55%, comprehension – 73% and Picture Story Writing – 65% (BTIPP-Report, 1999: Table 1. P. 46). The same test was given to 70 Grade 4 pupils from non NBTL classes. The average scores were as follows: Dictation – 35%, Comprehension – 48%, Picture Story Writing – 40% (BTIPP. Evaluation Report, 1999: Table 4.p.53). This shows that NBTL has indeed been an improvement in the Zambian education system.

From the examples above, CDC's general comment is that, the introduction of Zambian Languages in lower Basic Schools is a step in the right direction. Reading levels have started to improve for the first time since the introduction of local languages as a medium of instruction in the lower grades. CDC report recommends an increase in the number of local languages in our school curriculum, from the usual 7 to as many as young pupils find them to be more familiar than the current ones (MOE, 2002).

1.3 Learning English in a synthetic/phonetic way

Reading and writing skills are not independent of the system of the connections between the spoken and the written system of the language. Lyytinen, et al (2006), postulate that, each language has its own alphabet code and preferable methods of literacy teaching are based on structural characteristics of each language. English is one of the least regularly spelled languages and any conclusions about spelling development must take this into account (Alcock and Ngorosho, 2003). This means that, what could be said about reading in English, may not really be useful for other languages.

The problem with English originates from the fact that English represents five languages and their spelling systems superimposed on one another: Anglo-Saxon, Danish, Norman French, Classical Latin and Greek (McGuiness, 2004). According to McGuinness (2004), this makes English a very expressive language but also makes it very difficult to read. For example, there are 40 phonemes in English language and about 176 common ways to spell them. There are not enough letters in the alphabet for all the phonemes, for example, only 6 vowel letters for approximately 23 vowel sounds. Because there are not enough letters to encode the phonemes, digraphs (letter combinations) are used for a single phoneme. This complexity makes English an opaque language as there are multiple spellings for the same phoneme. According to McGuinness (2004), it is common practice in English speaking countries

to teach reading and spelling separately as though they have nothing to do with each other. Different words are used, different forms of instructions are taught at different days. This kind of practice totally obscures the code and nature of the writing system, and makes learning to read and spell far more laborious and confusing than it needs to be (McGuinness, 2004). In general, reading instruction regimes in English put more emphasis on whole word recognition and less on phonological decoding abilities than regimes in countries that have consistent orthographies (Landerl, 2000).

The key to understanding how reading skills develop is to understand how beginners learn to recognize written words accurately and automatically. A writing system or alphabet code is an encoding device for representing units of sounds in the language by a set of symbols (McGuinness, 2004). Encoding, or more commonly, spelling, is the fundamental or basic operation of transferring speech sounds (phonemes) into written symbols (graphemes). Reading, on the other hand, is decoding those symbols back into sounds to recover the words. Reading and spelling are reversible processes, and should be taught in tandem so that this reversibility is obvious (McGuinness 2004). Reading words take several forms: readers may utilize decoding, analogizing or predicting to read unfamiliar words (Ehri, 2005). The whole word methods rely largely on idea of "Sight Word". However, the process of learning sight words involves forming connections between graphemes and phonemes to bond spellings of the words to their pronunciations and meanings in memory (Ehri, 2005). Recent studies show that alphabetic knowledge enhances children's learning of new vocabulary words, and it influences their memory for doubled letters in words.

How do children learn by sight then? Ehri, (2005) says that the heart of word learning is a connection forming process. Connections are formed that link spellings of written words to their pronunciations and meaning in memory (Ehri, 1980, 1992; Pewrfetti, 1992; Rack, et al, 1994) that is, learning the letter-sound correspondences. This new information puts more emphasis on phonetic approach in literacy teaching in English, which used to depend largely on whole-word techniques which had many sight-words. Readers, in fact, learn sight words by forming connections between letters in spelling and sounds in pronunciation of words (Ehri, 1992, 1998). When readers acquire sufficient knowledge of the alphabet system, they are able to learn sight words quickly and remember them long term. It is now the consensus that most essential thing in learning acquisition is learning phonological skills (Vellutino, Fletcher, Snowling and Scanlon, 2004).

However phonological skills refer to learning phonemes (speech sounds), not to letter names. Treiman and Tilcoff (1997) discuss that learning letter names focuses children's attention on the syllable instead of the phoneme (es, em, ef, kay, pee, are) blocking their conceptual understanding of how an alphabet works. When teaching literacy skills, focus should be on actual phonemes, not letter names.

Invented spelling has been one way researchers have thought could improve the learning of English. In this approach, it is assumed that children "instinctively" figure out the writing system without explanations from teachers. There has been evidence for a long time that, invented spelling by definition will impede, halt or otherwise delay correct spelling (Treiman & Tincoff, 1977). Seeing misspelled words has been known to be harmful to learners. Wisbet (1999) discovered that if students took a spelling test, then saw some words misspelled when they took the spelling test again, the spelling errors increased 15 %. These results are supported by Brown (1988) who gave college students spelling dictation test of intermediate difficulty. Half the students saw half the words again and had to generate two possible phonetic spelling (misspelled) for each word. The other students did an unrelated task. The original spelling test was given again. The spelling errors increased by 17 % for the experimental group versus 7 % for the controls. The results were highly significant (McGuinness, 2004).

This new information on English literacy teaching has led to designing new approaches, such as McGuinness's "Prototype". McGuinness (2004) has proposed a new phonetic method of teaching literacy skills in English and listed features of a successful reading program:

- no sightwords (except high frequency words with rare spellings)
    - no letter names
    - sound-to-print orientation, phonemes not letters are the basis for the code
    - teach phonemes only, no other sound units
    - begin with code (one to one correspondence between phonemes and their most common spelling)
    - teach children how to write each letter and integrate writing into every lesson.

- link writing (spelling) and reading to ensure children learn that the alphabet as a code and that codes are reversible, encoding and decoding.
- spelling should be accurate or at a minimum, phonetically accurate (all things with reason)
- lessons should move on to include the advanced spelling code (McGuinness, 2004)

Children who have difficulty in acquiring phonological awareness and learning to map alphabetic symbols to sounds will also have difficulty acquiring orthographic awareness (Vellutino et al 2004). However, the importance of phonological awareness is smaller in so called transparent languages (Holopainen, 2001). Transparent languages, which consist most of European languages, including Finnish as the best example, have always been taught in phonetic methods. Whole-word approaches used in English speaking world have had little popularity in schools. The new information about English phonetics is promising: using methods proposed above, it is possible to teach children to read and write in English in 3 months (McGuiness, 2004). This would help English speaking children to learn basic reading skills just as fast as Finnish children learn reading skills in their own language (Aro, 2006).

1.4 The Literate game

Jyvaskyla University has conducted numerous studies on dyslexia. The latest innovation, the Literate Game, is based on the Jyvaskyla Longitudinal study of Dyslexia (JLD) which has followed about 200 children with dyslexia from their birth. There was a need to provide better rehabilitation for the children with dyslexia as early as possible, and a research on this led to the invention of the literate computer game which was specially developed for preventive training with children who are at risk of failing to acquire literacy skills at a normal rate.

The goal of the Literate Game is to enhance the accuracy of processing for phonemic sounds and to learn to connect them fluently to their orthographic equivalent (Hintikka, Aro and Lyytinen, 2005). The approach behind the game development was that a computer based training can easily reach everyone in need, irrespective of whether trained remediation personnel are available or not (Lyytinen, 2007). Introducing the learning of letter sound correspondences in a computer game context can make learning enjoyable and greatly assist those who are unable to master the connections without extensive

repetition. The game adapts to the individual level of ability and this ensures that players are supported by maximum positive feedback and the child's interest in further playing is sustained (Lyytinen et al, 2006a).

The game itself has very simple idea: a child hears speech sounds through headphones and sees a selection of written symbols moving across the screen. The aim is to match a symbol with a sound. If it was done correctly ("target"), the child gets a point. If it was a wrong choice ("distractor"), the same target item comes again so that the child gets a new chance to play that particular item. Items are repeated in different order and with different distractor options again and again until the child is able to choose the correct symbols without any errors. The game is adaptable, which means that each child will be training on his or her true performance level. When the player is good, the game items will appear on the screen faster and with more distractors. A less skilled child will have a slower game with fewer options on the screen. Each game level introduces new items which get gradually more difficult until the child is able to play with real words.

The early pilot studies of the Literate game were promising; indicating that non-reading children acquired basic reading skill after less than 4 hours of playing (Lyytinen et al. 2007). Also, in addition to being an entertaining learning tool for children, the Literate game has other positive features. The game records everything the player does, giving the researcher an opportunity to analyse children's choices, error styles and general learning process all the way through. The development of this game continues and it has been translated in several languages. At the moment Literate game is in wide use across Finland at homes, kindergartens, and schools. The estimated number of users in the summer 2007 was about 30,000.

The Purpose of the study

The purpose of this study was to explore the possibility of using a Literate game in the teaching of English literacy skills in Zambia. The Literate Game is designed to train the connections between written and spoken language using appropriate units. It is assumed that also Zambian children – many of whom are not native English speakers – and have difficulties in learning to read English, would benefit from the phonics-based training available via the Literate game.

2. Methods

This study is a sub-study of a larger research which was conducted in July-December 2005 in Lusaka, Zambia. The whole sample comprised of 1300 learners from Grades 1-4. The schools used in this study were three public or government schools whose literacy skills were studied either in Cinyanja or in English. The fourth school was privately owned school which uses only English in the teaching of literacy skills (see Kalindi, 2007). The overall purpose of the study was to gather data on how effective the Literate game would be in the teaching of literacy skills to the Zambian children. The aim of the research was to find ways of how the current curriculum can be supported, and thereby coming up with new innovations that would improve the current literacy skill programme to the children facing reading difficulties. Results of the research can be found in Ojanen (2007), Kalindi (2007), Kaoma (2008) and in Mando (in preparation) and Chilufya (2008). This particular study concentrated on the Grade 3 and 4 participants, and observations were made from their learning and effectiveness of the pilot version of the Zambian version of English Literate Game.

2.1   Zambian English Literate Game version

The way contents are presented in the game is based on similar ideas that McGuinness (2004) proposes in her reading programme 'Prototype'. Children are first introduced to simple, consistent sounds of English language and then taught to combine these sounds into words. Digraphs or chunks of words are also taught separately so that children learn to recognize these orthographic features in the words (such as "sh" or "ck"). The sounds were spoken by a Zambian person with whom the children are more familiar, and would not be confused with British or American accent, which they do not hear in schools.

This game version required a learner to attain a 100% performance in one level before proceeding to the next level. 100% performance was reached when the child made correct choices on the target item three times in a row. If a child made a mistake after two trials, the counting of three subsequent correct

choices started all over again. This meant that, the child had to recognize the asked target item at least three times without errors, no matter which of the distractors in the given level was presented with it. (See Appendix for full list of the game content).

2.2 Participants

In July 2005, 172 children were screened for reading problems in a Core Education School in Lusaka. 109 were Grade 3 children and 63 were Grade 4. The Grade 3 children were taught using the NBTL programme from Grade 1, and they were the first group in the school to be on the programme. The Grade 4 pupils unfortunately were in Grade 2 when the NBTL programme was introduced in the school, so they were not allowed to be on the programme as they were required to have started it in Grade 1.

After the tests, the researcher selected 30 pupils from both grade levels, concentrating on the ones who had lowest scores in the English Spelling. Also volunteering pupils with no reading problems were included in the study. The selected pupils were randomly divided into player and control groups.

2.1 Assessment Methods

Reading skills were assessed using the spelling tests. The spelling test had 40 items, 5 letters, 5 syllables, 15 three letter words, and 15 four letter words. The test was designed by Jane Erskine who selected the words based on the earlier experience in the field. Items were accepted as grade appropriate in Zambia. It was expected that the best grade 3 learner should get 30 points and the best grade 4 should get 40 points. Phonemes, not letter names, were used to ask spellings of letters. The orthography test was also designed by Jane Erskine and the words used were taken from pool of words that are common in children's literature and which represent the basic features of English Orthography. In this test the children were asked to underline all words which were spelled wrong. The pre-test word order was used in the July screening and September, pre-test and the post-test word order was used in November.

2.2   Statistical Analyses

In this study, the statistical T-test was used to analyse the data. Pre-tests were used to tell the differences in each group and each variable on each grade. To check for the improvement, the gain scores were used on variables and grade levels. The gain variable is the difference between the post and pre scores. Design for both variables and both grades and separately between groups.

The actual number of participants with no missing data for the analyses was: grade 3 player group 13, and grade 4 player group15, total 28. Where as the control groups, grade 3 were 15 and grade 4 were 13, total number of controls was 28.
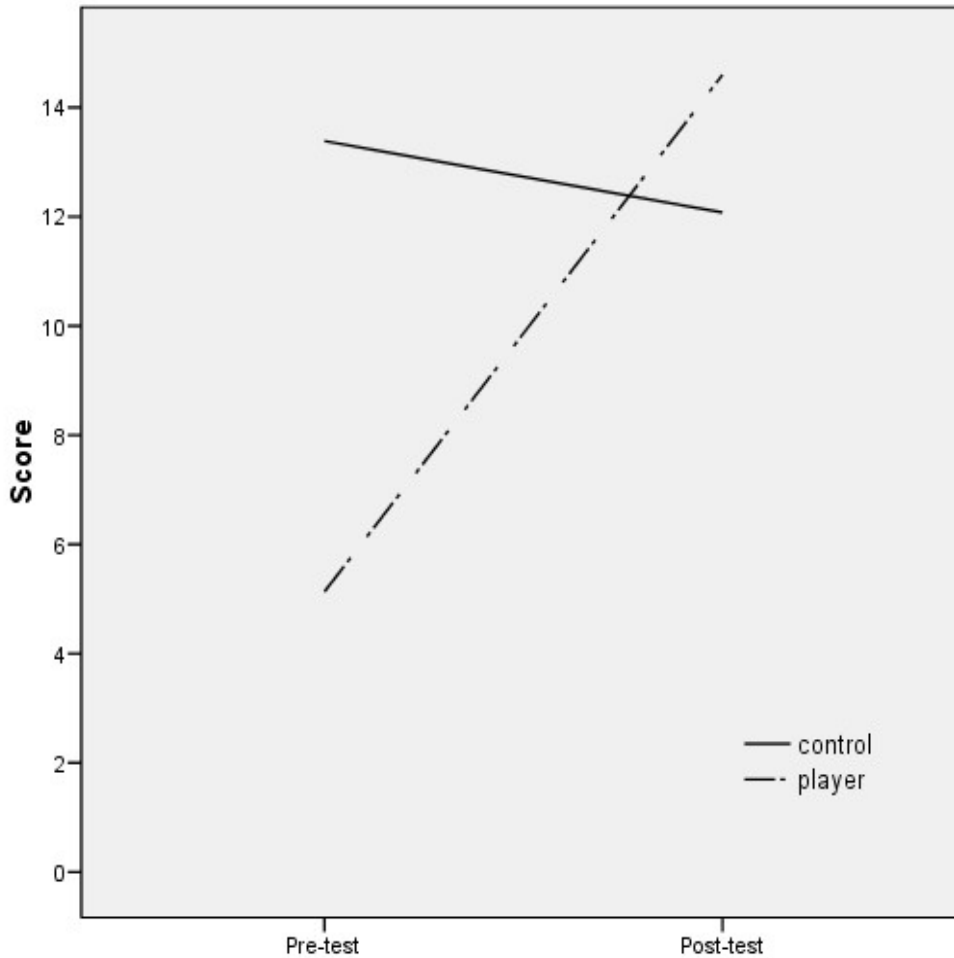
3. Results

Spelling test results, Grade 3
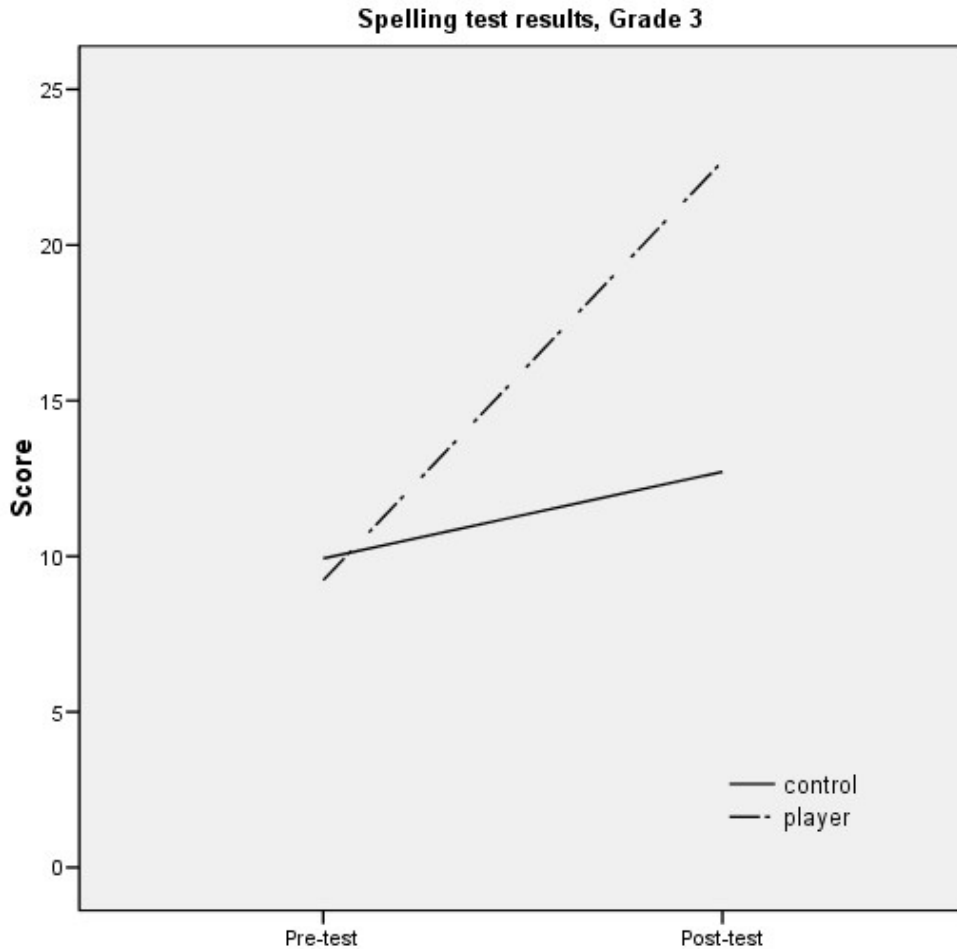
In the spelling pre-test, the difference of the mean scores on Grade 3 were the same between the control group (n= 14, M=10.13, SD= 6.3) and the player group (n=13, M= 9.2, SD= 5.8), and there was no difference in the equality of variance (sig .798) and the difference between the groups was not significant (sig. .699).

The difference of mean gains between the control (M= 2.78, SD = 11.31) and the player (M=13.46, SD= 12.79) group was tested with independent samples T-test. There was no difference in the equality of variance (sig..410) and the difference between the groups was significant (sig. .030, df=25, t= -2.301).
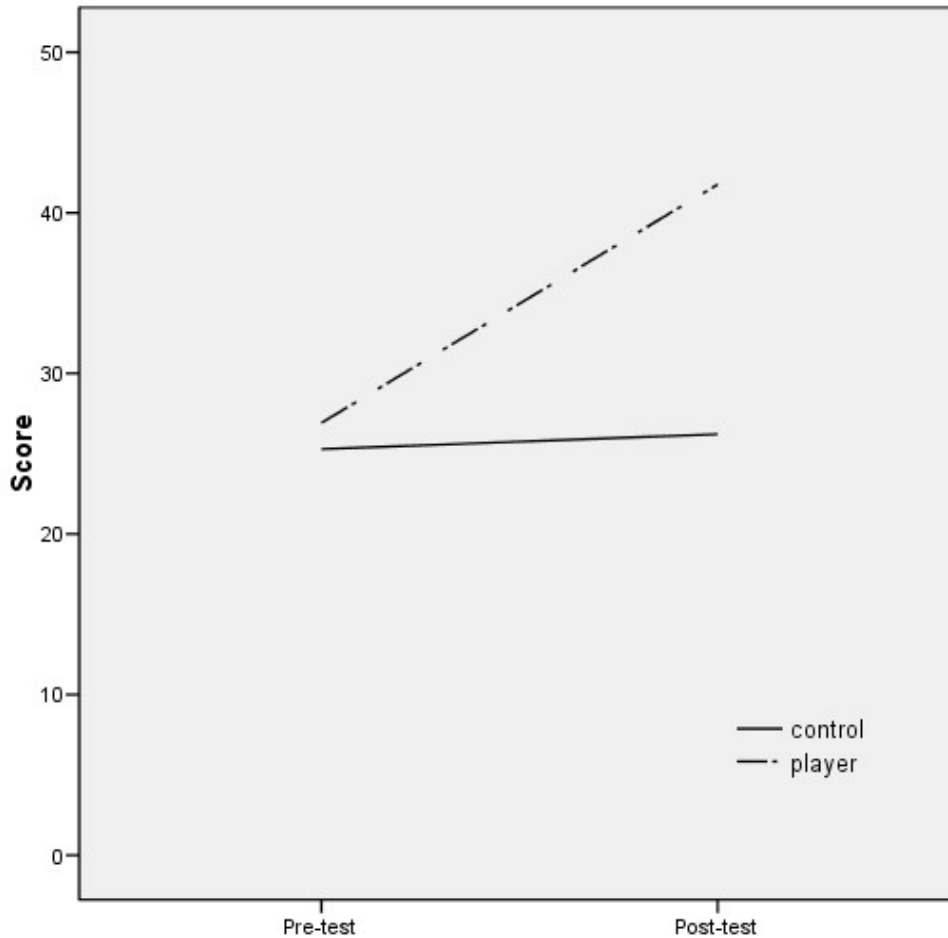
Spelling test results Grade 4

In the spelling pre-test, the difference of the mean scores on Grade 4 was not the same between the control group (n= 13, M=12.43, SD= 9.7) and the player group (n= 15, M= 5.13, SD= 4.8), and there was a difference in the equality of variance (sig .015) and the difference between the groups was significant (sig. .021, df=18.76, t=2,52).
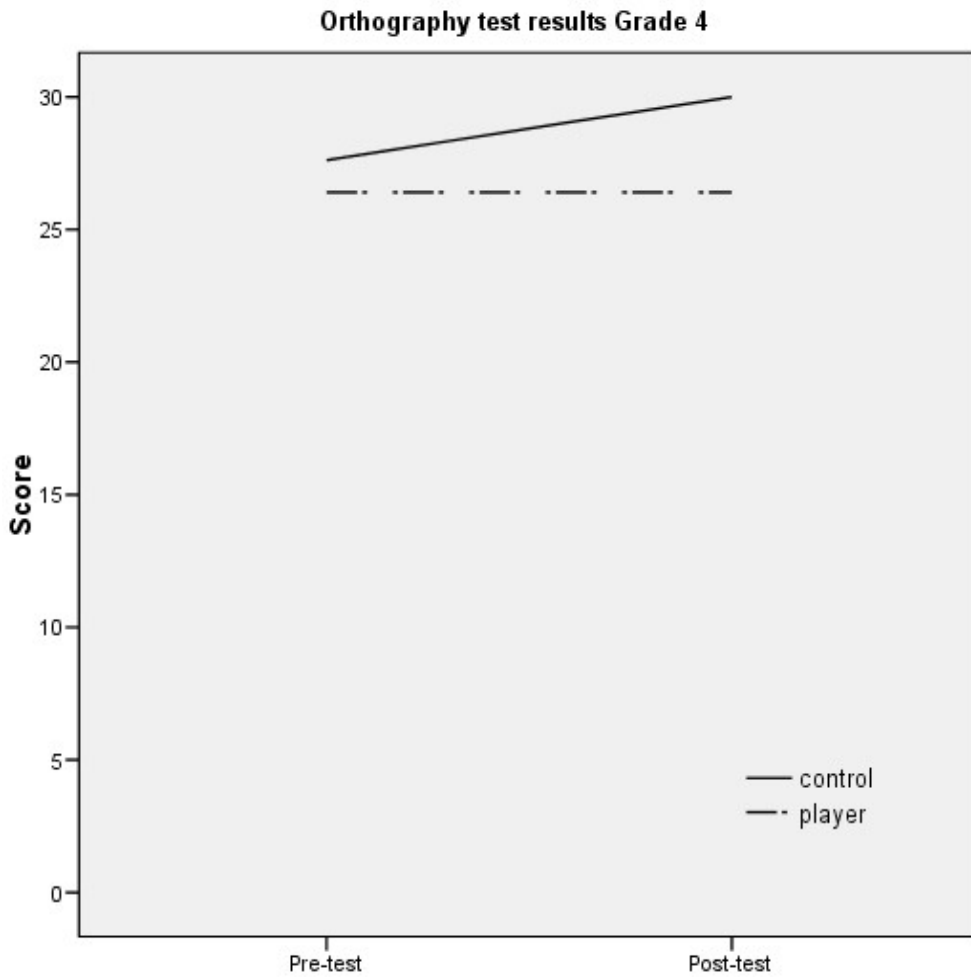
The difference of mean gains between the control (M= -1.3, SD = 14.67) and the player (M= 9.46, SD= 10.40) group was tested with independent samples T-test. There was no difference in the equality of variance (sig. .102) and the difference between the groups was significant (sig. .032, df=26, t= -2.265)

Orthography test results Grade 3

In the orthography pre-test, the difference of the mean scores on Grade 3 was the same between the control group (n= 15, M=25.6, SD= 4.8) and the player group (n=13, M= 26.92, SD= 8.5), and there was no difference in the equality of variance (sig .111) and the difference between the groups was not significant (sig. .612, df=26, t=-.513).

The difference of mean gains between the control (M= .928, SD = 11.3) and the player (M= 14.8, SD= 18) group was tested with independent samples T-test. There was no difference in the equality of variance (sig. .114) and the difference between the groups was significant (sig. .023, df=25. t= -2.419).

Orthography test results Grade 4

In the orthography pre-test, the difference of the mean scores on Grade 4 was the same between the control group (n=14, M=27.71, SD= 8.59) and the player group (n=15, M= 26.4, SD= 5.16), and there was no difference in the equality of variance (sig .079) and the difference between the groups was not significant (sig. .619, df=27, t=.503).

The difference of mean gains between the control (M= 2.38, SD = 10.9) and the player (M= .000, SD= 8.32) group was tested with independent samples T-test. There was no difference in the equality of variance (sig. .497) and the difference between the groups was not significant (sig. .520, df=26, t= .653).

4. Discussion

This study has explored whether the Literate game would benefit the Zambian children in improving their English literacy skills using the Finnish designed literate game adapted to suit to the Zambian setting. It was hoped that the study would bring new innovations in the teaching of reading to the Zambian children, thereby contributing to the existing quest of trying to find answers to the underlying reasons for the low literacy levels in Zambia.

Generally, the children had an idea about the alphabet sounds and they seemed to posses the basic blending skills. They showed interest and enthusiasm to play even though some children were using the computer for the first time. The children were motivated to take turns in playing.

The player group improved significantly compared to the controls in most tests. Improvement was significant particularly in the spelling test. In the orthography tests, the control and player groups in both grade levels were unfortunately in different starting levels before the intervention, which caused validity problems in the statistical tests. However, it is noteworthy that the player group was able to catch up with controls. This change as such is significant as the players were able to improve their score up to the level where the controls were in the pre-test, even though the difference between the controls and players in the pre-test was statistically significant.

The biggest flaw in the English game used in this study was that the sessions were too long and the children got bored. Also the children had problems with the pronunciations to certain words on the computer. The sounds of certain words were problematic for children especially words like bid and did, sit and seat, and how the f and v sounds were pronounced. This problem can be attributed to the way the sounds were recorded, interfering with the sounds that the children were already used to. It can be speculated that, the children had not yet acquired the phonological skills relevant for the attainment of literacy skills in reading. Despite of these deficits in the pilot version of the game, the results were promising.

In terms of the Grade 3 player group, there was a significant improvement in their Orthography skills getting 14 points more (on average) where as the controls did not improve at all. The Grade 4 player

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group did not improve their orthography skills but on the other hand, the improvement of the control group was not significant either as they got only about 2 points more gain in the test (on average).

4.1 Recommendations and Conclusive remarks

The current curriculum has scored its own successes and failures in the field of teaching reading to learners. In spite of the introduction of a child centred approach to learning to read, which takes into account the different needs of the learners, pupils with reading problems were not benefiting from this arrangement in terms of acquiring reading skills (Kalindi, 2005).

It was discovered that the poor readers exhibited very poor knowledge of the alphabet and sounds, and they were not able to put sounds together. This suggest that, more sound syllable and phoneme training need to be done and this should begin with the teacher training colleges. It was discovered during the study that, some teachers learnt how to use the NBTL in the field when they had already started teaching. The NBTL programme was not in the curriculum of the teacher training colleges and the teachers were not familiar with the programme. The NBTL programme was initiated by the donors in conjuction with the Ministry of Education. The teacher training colleges were not involved in the process. The NBTL would have worked well if it began with the teacher training colleges, before introducing it in the classroom.

It was also discovered during the study that, the instructions in English were not fully understood by the children. The researcher had to repeat the instructions again in a local language. After this, the children seemed to understand the instructions and go on with playing. This symbolized that, children still needed to acquire the literacy skills in the local language before they can transfer them to English. These findings are also supported by Webb and Kembo, (2006b) who after their studies in South Africa said: "One of the tasks that Linguists in Africa need to undertake is to persuade parents that the answer to their needs and those of their children lies in the use of a language of learning which their children know well, together with high quality teaching of English as a subject". Therefore it would work well for the Zambian children if they learnt in the local languages up to grade 2 before English language is introduced.

It was observed along with the actual study that, positively the NBTL classrooms had a lot of reading materials. However, despite the adequate reading materials, learners still lacked the reading skills. The learners tended to picture read as they were still at the pre reading stage despite being in grade 2. This can also be attributed to the kind of materials being used and how suited they were for the grade level and whether there was room to provide assistance to the poor readers in the programme. McGuinness (2004), wrote that, as English language is a highly opaque language, the methods of teaching English should allow the learners to acquire sufficient knowledge to read and write sounds and letters, and connecting this immediately to words.

The New Breakthrough has got its own successes, however there are certain shortcomings in the programme. For instance, it clearly stipulates in the Teachers Guide that, the teaching time is not adequate to meet all the learners at the teaching corner in the given one hour. Since the lessons covers only one hour per day, the children, who are not able to meet with the teacher to conclude the days work, are disadvantaged.

Secondly, the teachers who have not attended the in service training programme found it difficult to teach certain areas such as sounds and letters which they failed to understand themselves as teachers. Some teachers were not even oriented in the teaching of the NBTL. If the teachers themselves are lacking this knowledge, how can they teach it to the learners? This is the biggest shortcoming of the programme which affects learning to read. McGuinness, (2004) points out that, there must be a strong emphasis on teaching the relationship between sounds and letters.

The other deficit in this course is that, the work is supposed to be presented in a certain chronological order. The NBTL kit is in use every day of the week. It would therefore obviously suffer some wear and tear. It is stated that, to replace individual components, let alone the whole kit, is the teacher's responsibility. As a result, teachers have been given advice on how to replace the materials. This means that, for a teacher who may not have the means and resources to undertake this kind of exercise, will definitely experience some problems in the teaching of this programme. There would be gaps, and hence the learning process can be affected. It is not known whether the Ministry of Education has put in place any measures to see to it that the lost or torn material are replaced, or who is supposed to do the improvisation, apart from the teacher who may not even have the means and capacity to do that.

Another problem with the NBTL is that though the medium of instruction is in the Local Language, not all teachers involved in this programme are fluent in the languages that they are made to teach. Hence the intonation and pronunciation might not be done perfectly well. Poor pronunciation affects the acquisition of the phonemes and consonants which will equally affect the acquisition of English.

At this point the Literate game can supplement the NBTL. The Literate game and the NBTL, can work side by side because they have the same intentions of promoting the sounds, syllables, phonemes and sound blending. The sounds on the computer need to be improved in terms of pronunciations so that the sounds are properly articulated with their right intonation in the English version.

In conclusion, the children seemed to benefit more from the short exposure to the Literate game in reading than they comparably learn during years at school. The effects vary from substantial gains to very large gains between grades and measures as shown in the results.

This study introduced a number of new areas to be studied in the future. The optimal results would however, require better integration of teachers to understand the basic issues affecting reading acquisition in highly regular Zambian local orthographies. The level of Finnish children, who read a very comparable orthography with 95% accuracy at the end of the first grade, could be reached in Zambia too, if only the teaching procedures can be made as efficient as they are in Finland. The benefits of the illustrated learning game can assist the participating Zambian teachers to better understand how the Finnish reading results are possible. The literate game benefits are based on the so called synthetic phonic instruction which is very efficient, and is based on the regularity of the orthography. Thus, one needs to learn only the number of consistent connections which is about the same number of letters used in the writing system such as in Cinyanja (in Finnish where it is 23). The situation differs radically from the necessary pre-requisites for learning the English orthography, where the comparable number of connections between written and spoken units is certainly more than 1000, possibly as many as 1800, depending on the expert who has computed the estimates.

All this new information from comparative reading research across languages offers vast amount of knowledge that can be used in Zambia in order to find the lasting solution to reading problems affecting children in the early years, thereby making our future generation a literate generation.

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Appendix 1 Screening test results

Grade	Assessment method	N	Min	Max	Mean	Std. Dev
3	Cinyanja spelling	111	0	31	6.96	7.26
	English spelling	109	0	38	16.66	11.17
	Cinyanja orthography	111	1	51	19.87	10.56
	English orthography	111	0	72	27.33	16.84
4	Cinyanja spelling	138	0	36	10.43	8.23
	English spelling	63	0	39	16.81	11.06
	Cinyanja orthography	138	0	56	26.26	9.91
	English orthography	63	0	75	41.48	15.37

Maximum scores of the both spelling tests was 40.

Table 1: Screening test results from July 2005

Appendix 2 Literate Game contents

Level 1 f i m v

Level 2 p b a n

Level 3 d l k o

Level 4 if in am an on

Level 5 dim pip nip dip lip bib pin bin did lid kid

Level 6 map nap lap fan man van pan mad pad bad dad pal

Level 7 mop pop pod nod nd and band land pond bond

Level 8 nd and band land pond bond pl bl blip blob plan plod bland blond

Level 9 sh j ch ship shop jam job chip chin chop fish dish mash bash posh

Level 10 ck x wh pick kick pack back lock dock fix mix fox box

Level 11 black block shack shock chick whip wham which whack

Level 12 ng nk ping king fang bang pong long ink pink bank bonk plink blink plank blank plonk chink shank

Level 13 oi ay ee oo pay day bee boil join deep need moon food pool look play bleep bloom cheek wheel

(see in detail Kalindi, 2007)

Appendix 3 Spelling test

Spelling test – English items

Items 1-5 are said as phonemes!
Pay attention to your pronunciation and be as
exactly English as you can.

1. l   /l/
2. i   /i/
3. d   /d/
4. b   /b/
5. m   /m/

6. dim
7. di
8. did
9. bid
10. bi

11. his
12. for
13. can
14. not
15. but

16. she
17. the
18. that
19. you
20. and

21. big
22. bed
23. let
24. yes
25. get

26. with
27. when
28. have
29. what
30. was

31. from
32. must
33. stop
34. help
35. just

36. said
37. out
38. all
39. they
40. like

Appendix 4 Orthography test

Name:

d	д	o	Σ
bit	lΦg	hut	rgu

==

a	t	s	z	r	Ω	Э	w	c	Ж
¥	u	p	h	Ψ	l	v	q	k	φ
Σ	m	i	Б	Θ	f	x	g	β	e
j	z	c	λ	Љ	b	n	Ə	u	y
dog	bƏs	hen	rub	pho	pom	wax	zpi	lid	sum
gbe	fat	nut	ung	jβr	tin	wag	nam	dot	sit
lip	box	tΣp	cot	fun	tpo	tha	cub	net	gar
mud	pet	ith	sip	tne	der	lφg	jam	van	sun
clЖp	drang	glad	star	tdans	plug	lump	pink	sten	crisp
drum	frost	orck	trunk	prask	milk	ndelb	plant	jump	bΩnk
lteb	thur	scarf	ster	flip	step	blink	tΦnt	swim	pond
drop	dnem	skin	cramp	knird	jƏnk	melt	hand	talf	grub
rock	b¥ng	shop	knath	meat	rtain	song	hope	bath	nich
sleep	duth	nΩck	pain	ckirb	shelf	moth	deep	soap	neam
mcuh	clock	wφφp	cloth	chink	duck	toab	fish	swing	tase
clang	nobe	make	brush	wait	shect	king	hwis	rich	flЭΣt
fiel	wine	wall	hΨΨf	doul	crowd	nail	quiz	fluff	tsoor
ssrag	mill	fire	town	stoim	tλne	night	bell	tiek	sore
kibe	rade	boil	hair	quжt	kiss	ffup	doll	buzz	sound
moon	rude	hill	tloo	coin	sp¥ll	ball	cure	wond	ghig
price	cage	whip	ceaf	hЉge	knot	nophe	wrap	mbob	hedge

Appendix 5 Basic code spelling of English

English Phonemes and Their Basic Code spellings (By McGuiness, 2004)

Sounds are indicated by slash marks

Consonants Sounds	As in	Basic code spelling
/b/	big	b
/d/	dog	d
/f/	fun	f
/g/	got	g
/h/	hot	h
/j/	job	j
/k/	kid	k
/l/	log	l
/m/	man	m
/n/	not	n
/p/	pig	p
/r/	red	r
/s/	sat	s
/t/	top	t
/v/	van	v
/w/	win	w
/z/	zip	z

The following are combinations of two consonants with special spellings:

/ch/	chin	ch
/ng/	sing	ng
/sh/	shop	sh
/th/	thin	th
/th/	them	th
/zh/	azure	_

/ks/	tax	x
/kw/	quit	qu

Vowels Sounds	As in	Basic code spelling
/a/	had	a
/e/	bed	e
/i/	hit	i
/o/	dog	o
/aw/	law	aw
/u/	but	u
/ae/	made	a-e
/ee/	see	ee
/ie/	time	i-e
/oe/	home	o-e
/ue/	cute	u-e
/oo/	look	oo
/oo/	soon	oo
/ou/	out	ou
/oi/	oil	oi

Vowel + r

/er/	her	er
/ah/-/er/	far	ar
/oe/-/er/	for	or
/e/-/er/	hair	air