Observations on possible use of the "Literate" Game on Poor Readers in a Multicultural Classroom Setting

Sylvia Chanda Kalindi

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Department of Psychology
University of Jyväskylä

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ABSTRACT

Author: Sylvia Chanda Kalindi
Supervisor: Heikki Lyytinen
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The 'Literate' game, developed in Finland, is designed to help enhance learning letter-sound correspondences and later reading of words with increasing complexity in children. The 'Literate' game uses the phonetic/synthetic method of teaching phonological awareness which is currently seen as the basis of all reading. The 'Literate' was piloted in Zambia (2005) to determine how it could be implemented into a multi-cultural setting. Factors such as pre-intervention skill and language background were examined in relation to observations of the game-based learning among the poor readers.

A sample of 8 pupils (6 girls and 2 boys) was selected from a Grade 2 class at a private international school in Lusaka based on a screening test to identify poor readers. The pupils then underwent intervention on the 'Literate' game version which was specifically designed for the study and had a Zambian English accent in voicing of the game sounds. The players' performance during the intervention process was recorded by the computer and analyzed qualitatively.

The results indicate that the reading performance of all the pupils improved pretty well both during and after the intervention even if it was noticed that pupils with better reading skills improved more than the pupils with poor skills. Furthermore, pupils with a language background different from one used in school also did not perform so well neither did they go so high in their levels on the 'Literate'. It was also observed that the 'Literate' game version used in this study had some deficits such as lack of clarity of the audio sounds which greatly affected the intervention process.

It has therefore been concluded that the ‘Literate’ is a usable tool in literacy instruction and can also be used a multi-cultural classroom nevertheless issues of accent, sound quality and duration of intervention are important factors in the outcome of the intervention.

Keywords: multicultural, English literacy, computer-based training,

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1. Introduction

Reading is a process of extracting and constructing meaning from written text for some purpose (Vellutino, Fletcher, Snowling & Scanlon 2004). Over the past four decades a lot of research has been done on almost every topic related to reading (McGuinness 2004). Currently there is a mass of information on reading revealing different interesting facts such as how reading skills vary from one country to the other and how the writing systems represent language (McGuinness 2004, Mann 1991). In every sense, reading is significant in general ways that touch everyone because the ability to read and write is an essential ingredient of success in most societies where so much information is conveyed by the written word. However learning to read is a paradox in that it seems so natural to the literate and yet for so many children, learning to read is an extra ordinary effortful task that may be a long and complicated process lasting several years (Rayner, Foorman, Perfetti, Pesetsky & Seidenburg 2001).

1.1 Reading problems vary in different countries

As a matter of fact, a reading problem in a particular orthography (writing system developed for language) is not necessarily a problem in another. Children in English speaking countries have far more difficulty learning to read than children in many European countries, a fact that is reflected in how reading is learned (Aro & Wimmer 2003) and measured (McGuinness 2004). In English speaking countries including Zambia, the main test of reading success is the ability to read isolated words one at a time accurately, yet in many European countries such as Italy, Finland, and Spain this skill is "of little concern because every child reads accurately" (McGuinness, 2004:xv).

The differences are due to the way individual speech sounds or phonemes are mapped to symbols in various alphabetic writing systems. Children who have difficulty in mapping alphabetic symbols to sound also have difficulty in learning to read and spell (Wagner & Torgesen, 1987; Snowling, 1980; Mann, 1991; Liberman & Shankweiler, 1991; McGuiness, 2004). Moreover, such difficulties have been found to continue well into adulthood (Vellutino et al., 2004; Wagner & Torgesen, 1987).

In a highly ‘transparent’ alphabet like most new writing systems, there is mainly one way to write (spell) each phoneme in a language making them easy to teach and learn because each letter or grapheme has only one sound and vice versa. Whereas highly opaque alphabet codes like English with multiple spellings for the same phoneme (be, see, sea…) can be very hard to teach and learn (McGuinness, 2004; Rayner, Foorman, Perfetti, Pesetsky and Seidenburg, 2001).

1.2 Prevalence of reading difficulties

In view of the above fact, there are a lot more children with reading difficulties in English speaking countries than is the case in most European countries. In a comparative study, McGuiness (2004) reveals that Austrian 7 year olds read comparable material as rapidly and as fluently as the English 9 year olds while making half as many errors when in fact the Austrian children only had one year of reading instruction while the English children had been learning to read for 4 to 5 years.

Vellutino et al. (2004) also highlights that early reading difficulties in children with reading problems are manifested primarily in inadequate facility in printed word identification as well as inadequate facility in related skills such as spelling and phonological (letter-sound) decoding. In this case acquisition of facility in alphabetic mapping depends, in part on the acquisition of phonological awareness and both are causally related to reading difficulties (Adams, 1990; Blachman, 1994; Bradley & Bryant, 1983; Williams, 1980).

Mann (1991) states that learning to read is a task that poses considerable difficulty for between 4 and 10% of children with reading difficulties.

1.3 Teaching reading

Globally, the teaching of reading has gone through various cycles where the phonics type was replaced in the early twentieth century by the ‘look and say’ or whole-word method. In the 1990s however, reading researchers supported by the state and national politicians in the U.S.A claimed they wanted to return to phonics (McGuinness, 2004). Williams (1998) also states that many U.K. teachers and reading specialists now believe that initial readers are helped if they already have an appreciation of the fact that words are made of

different sounds. Such appreciation is probably fostered by rhymes, songs and word play through minimal pairs (such as shells, bells) or contrastive addition (like row/grow) that alert learners to the phonemic system. Thus, irrespective of the language concerned or the eventual reading instruction approach, the development of initial reading skill is partly a function of pre-reading experiences, which is not directly connected with written language (Bryant & Bradley 1985; Goswami & Bryant, 1991).

1.4 Reading programmes in Zambia

According to William (1993) the Zambian government introduced a number of reading programmes overtime such as the Zambia Primary Course (ZPC) and the Zambia Basic Education Course (ZBEC). MoE (1996) points out that for almost thirty years, initial reading in Zambia was carried out in English, a language that most children have very little or no knowledge of when they start school. From the early seventies to the early nineties the ZPC was used. The principal approach to reading was the look and say (whole word and whole sentence) approach, with a certain amount of phonics in the second year (Williams, 1993). Williams (1998) further states that from the early nineties the ZBEC was introduced. The ZBEC was expected to encourage teachers and pupils to think of reading as a process of obtaining information and as an opportunity to be communicated with, rather than a process of parroting the book. In this course the main method used in Grade 1 was the "look and say" as is in the former course, but phonics was introduced in a very simple way.

In the early stages there was a great deal of matching single words to pictures of objects and labelling of aspects of the classroom (like chair, wall…). Reading and writing were integrated in the sense that pupils wrote down words and sentences that they read.

Williams (1998) also reveals that initial reading in Zambian languages appeared to occur very infrequently. Where it was taught, the main method employed, after letter formation and approximate sound values had been established, was the syllabic method. When learners moved on from the syllabic method, the approach to word and sentence reading was largely "look and say".

The syllabic approach was based on "consonant-vowel" sequences such as ba, be, bi, bo, bu; ka, ke, ki, ko, ku, and the like. From these, teachers prepared written "syllable charts", as in the following example:

a	***e***	***i***	***o***	***u***
la	***le***	***li***	***lo***	***lu***
sa	***se***	***si***	***so***	***su***
ma	***me***	***mi***	***mo***	***mu***
ta	***te***	***ti***	***to***	***tu***
ka	***ke***	***ki***	***ko***	***ku***

Illustration 1: Syllable chart for teaching Zambian native languages (Williams, 1998)

The chart provided the basis for various activities, particularly making up different words from the chart (.for example kalulu, hare; sukulu, school; amai, mother). Such word play activity appeared to be very popular with learners, and alerted them to the fact that words were composed of sounds, and that sounds were represented by letters (Williams 1998).

1.5 Beyond initial reading

Once learners acquired the basics of reading in a language, that is, they knew "how to read", and also had adequate proficiency in the language(s) concerned, teachers generally moved on to "reading comprehension" of short passages which appeared in the course books. This typically consisted of an explanation of "new" words by the teacher, then a "model reading aloud" of the text sentence by sentence, either by the teacher, or a few pupils known to be competent, followed by choral repetition of the text by various combinations of the class. Finally there were oral questions, which were again generally answered by the more able pupils and chorally repeated by the class; pupils were then required to write the answers to the questions already answered orally (ibid).

1.6 Overview of the reading programmes

The programmes however did not make much of a difference to the bleak literacy picture seeing that the children who completed the lower and middle basic levels could not exhibit the expected fundamental reading, writing and numerical skills (MoE, 1996).

In Zambia the issue of poor reading levels had seen the concern of a number of stakeholders, including the Ministry of Education, parents and teachers for some time. According to Tambulukani (2002) the concern arose from a number of 'danger signs', which had become evident in different sections of the Zambian society. The 'danger signs' included primary school children not reading at desirable levels, secondary school children not exhibiting adequate reading and writing skills, students in tertiary institutions like colleges and universities exhibiting reading and writing difficulties as well as a general decline in the reading culture of the country. In addition to this, other surveys such as the National Assessment revealed that the performance scores in English and mathematics were low in all parts of the country, for both sexes, and for those from all socio-economic strata in society (Kelly & Kanyika, 2000). Tambulukani (2002) also states that the Southern African Consortium of Education Quality (SACMEQ) of 1995 revealed that 25% of the grade six pupils who were tested and able to read at minimum levels, only 3% were able to read at desirable levels, that is, able to read materials of their grade levels.

1.7 The current Zambian policy on reading

In 1999, the Ministry of Education (MoE) launched another reading programme, a major literacy programme called Primary Reading Programme (PRP). This programme has 3-pronged objectives to ensure that this purpose is met, that is, to ensure that: (a) children acquire basic literacy skills in a familiar language in grade 1 and have a basis in oral English language, (b) children transfer the literacy skills into English which remains the main medium for education in grade 2 and, (c) that children develop and extend these vital literacy skills in grades 3 to 7 to give them access to the entire curriculum (Kanyika, 2002). The Ministry of Education attaches high priority to the attainment of this goal. This is reflected in the policy document, which stipulates that:

The aim of the curriculum for the lower and middle basic classes (Grades 1-7) is to enable pupils to read and write clearly, correctly and confidently in a Zambian language and in English (MoE 1996: 34).

The New Breakthrough to Literacy, the main programme engineered under PRP uses a combination of methods. It has not relied on one, as other reading courses in the past have done. It includes other approaches like Phonics, Syllabic, Look and Say and "Real Books" which allows learners to read real books (MoE, 2002).
However, most independent or private international schools in Zambia do not use the above reading programme because they follow other phonic British based programmes.

1.8 Teaching English initial reading skills at this private international school

A coctail of phonic based programmes such as the Progressive Phonic Assessment and other material on phonics from the Nelson and Oxford programmes were used to sensitize children to blending skills. Pupils were taught to identify the initial and final sounds in a word before they learnt to put the sounds together and read. The reading progressed systematically from two letters to three and four letter words as the pupils advanced. Before they learnt to read however, pupils spent two years in the pre-school. In the first year they were introduced to 'letterland' characters and were slowly taught the alphabet sounds (not letter names) following the Montessori programme. In the second year of pre-school pupils were slowly taught skills of blending two sounds and would later be able to read two or three letter words as well as a few four letter words. At this time they were also introduced to characters in the Oxford reading tree series and were also taught to read the elementary books in this series, which usually contained a lot of pictures and one short sentence on a page (Hunt & Brychta, 2004). Sight word reading of difficult word patterns like 'the' and 'girl' was done alongside reading the Oxford books.
In the first grade, a review of initial and final sound identification in words was done as well as skills for reading short words. The reading culture was introduced quite early that is, on a daily basis pupils were expected to read a book from the Oxford series of books

with the teacher and then had to carry the book home to read through again with parents (Hunt, 1989).

It is important to note here that being an international school this private school had a multicultural setting. The term 'multicultural' carries several connotations though in this case definition by the International Research on Literacy Research would be more appropriate, that is "how several languages and cultures exist in the same region" Mallozzi & Malloy (2007 pg 436). For a number of pupils at this school, English would be their first language while for a greater majority it varied from Hindi, Afrikaans, and Lebanese to a wide variety of African languages. In this regard most pupils learnt English as their second language and this brought about understanding of other cultures and respect for other people (Mallozzi & Malloy, 2007). However learning English as a second language also increased the difficulty for students to learn the second language when the first language had different orthographic and lingual bases than the second language (Aro & Wimmer, 2003; Oney & Goldman, 1984; Mallozzi & Malloy, 2007).

1.9 Intervention using the computer

Support for early reading with computers was first provided by Atkinson's (1970) Stanford University computer-based curriculum, which was developed for use in kindergarten through grade three. Although this curriculum yielded positive results, it is only within the last decade that the computer based preventive treatments began to be reported in literature (Gore, Morrison, Maas & Anderson, 1989; Beech, Pedley & Barlow, 1994). However scientific findings (for example Bradley & Bryant, 1983) for specifying the appropriate foci of training were available earlier.

Despite initially promising results, the speech feedback based procedures were apparently insufficiently successful to maintain their status because focus shifted towards the development of multi-sensory treatments (Boone, Higgins, Notari & Stump, 1996). A careful study of literature on computer based training by Lyytinen, Ronimus, Alanko, Taanila & Poikkeus (2007) found that very few studies fulfilled at least three of the following criteria: 1) participants being non-readers at the outset, 2) focus on at risk children, 3) core skill reading, letter-sound connections, included as a central focus of the preventive reading instruction, 4) no experts necessary for the concrete provision of

training, 5) full time participation of an adult not required and 6) strong emphasis on captivating the interest of the child.

Although Beech, Pedley, & Barlow (1994) recommended that training in the letter-sound connections should be supported by kinaesthetic experience, treatment gains were not observed. In another development Boone, et al. (1996) exposed 5 to 6 year olds to 7.5 minutes' computer based playing with letters once per week for a year. The poorest children in letter knowledge however did not benefit from the training probably due to inadequate consideration of the irregular letter-sound connections in English (Lyytinen, et al. 2007). Erdner, Guy, & Bush, (1998) further reveal that letter-sound discrimination training if provided in a relatively massed way (3 times per week), for a sufficiently long time (one year) can have significant effect on reading skill and support reading skill especially among boys. Van Daal and Rietsma (2000) also reported that, kindergarteners who received approximately 3 hours of computer-assisted training in vocabulary, phonological skills, letter-sound connections, reading and spelling showed significant gains. The analytic and synthetic phonemic awareness instruction with computer assistance to kindergarten children by Hecht and Close (2002) also observed significant gains in blending, reading and invented spelling.

Although the results of some reviewed studies are partially promising it is not clear how helpful computers can be in terms of implementing preventive interventions (Lyytinen, et al. 2007).

1.10 The 'Literate' computer game

Lyytinen, et al. (2005) from the University of Jyvaskyla in Finland developed a game called 'Literate' in which a player made a choice from orthographic items that matched a concurrently delivered auditory item. The orthographic items were falling balls, each containing a written stimulus. The relevant auditory stimulus was delivered via high quality headphones and honing in and clicking the mouse on the relevant orthographic target made the choice. Only one of the presented 2-9 orthographic items matched with the spoken item. The starting requirement was to connect sounds to letters and then via several subsequent levels of playing of the same format the player proceeded towards difficult pseudo word items. As the emphasis was on adaptation, the number of

orthographic alternatives (distractors) and the speed at which the balls fell was initially very low. However as the game proceeded, the number of distractors and speed were adjusted in keeping with the developing level of the individual player, ensuring thereby that the game was always challenging without being so difficult that the child became frustrated by thwarted attempts. The programme also saved data on the progress of each child, thus allowing for continuity of subsequent levels of difficulty (Lyytinen, Erskine, Aro & Richardson, 2006).

According to Lyytinen et al. (2007) the goal was to enhance the accuracy of processing phonemic sounds and to learn to connect them fluently to equivalent orthographic stimuli. In addition to this, the game was made enjoyable by provision of experiences entailing both challenge and success.

This game was piloted on several occasions in Finland where non-readers started to play the game at 6-7 years when children enter school. The total playing time varied from 1.5 to 4 hours depending on the need and playing motivation of the child. All children were selected from children screened for the study who did not read or whose reading ability was minimal. Generally the results indicated that children who played the 'Literate' game for one to three hours clearly outperformed those who only received the normal support offered by the school.

In this study, an English version of the 'Literate' computer game was introduced to children with poor reading ability in a multi-cultural classroom. The general purpose of the research was to observe how the 'Literate' based training (carried out in Zambia) would help poor readers in a multi-cultural classroom acquire basic reading skills. The specific issues were to note how issues of pre-intervention skill and language background affected the gains in accuracy of identifying orthographic items on the basis of their spoken correspondences from practising with the 'Literate.'

2.0 Method

It is important to note here that this study was part of a larger research that was carried out in autumn 2005 in Lusaka, Zambia. It comprised a sample of 1300 pupils from grades 1-4 in 3 public schools and one private international school. The studies carried out in public schools used both the Cinyanja (native language) and English version of the 'Literate' while the other one done at a private international school used an English version. It is worth noting that in the English version, the speaker of the game sounds had a 'Zambian English' accent. This English version of the 'Literate' was also used in public schools.The entire purpose of the research was to find how beneficial the 'Literate' game would be to the Zambian children and also to observe the learning process including some salient features of reading difficulties in the children. It was the intention of the study to find means of supporting the current curriculum and provide new ways of improving the quality of literacy instruction, furthermore introduce a method of remedial teaching for children who have compromised reading skills using the computer.

2.1 Participants

The target population in this study were all second graders from a private international school in Lusaka. This class was largely heterogeneous with pupils coming from different parts of the world such as Lebanon, India, Europe as well as Zambia. The total sample comprised 24 Grade 2 pupils with ages ranging from 5-7.

In the first term of the second grade (October 2005) the whole class was given a screening test in spelling and orthographic fluency and those with poor reading abilities were incorporated in the English version of the 'Literate' which was specifically developed for this study. These pupils had spelling and fluency scores in the screening test of at least 1.5 below the standard deviation. This process ensured that the intervention procedure was targeted to those who were in greatest need of additional support.

The poor readers (8 pupils – 2 boys and 6 girls) were then subjected to a deeper assessment before and after the intervention period. Thereafter a post-test was done (in December) and a follow-up test after 5 months to note consistency in results over a period of time.

2.2 Design and Materials

The study consisted of a pre-test, training period, post-test and a follow up assessment. Before and after each training period, a deeper assessment was administered to the intervention group. This study was basically a case study of 8 pupils, making observations on the learning process and how effective the 'Literate' was to them. The case stories revealed the background information, the initial literacy skills, learning process and the outcome of the intervention. Children's performance in the tests was described qualitatively. Similarities between the children are discussed in the summary of the results.

2.3 Assessment methods

2.3.1 Pre-intervention assessments

Reading tests of spelling and orthographic fluency were chosen as screening measures and were later used as pre-tests.

The spelling test was designed so that it had 20 items (5 sounds, 5 syllables, 5 three-letter words and 5 four-letter words). This test was designed by the researcher, according to the estimated performance level of the pupils, with reference to the Grade 1 Phonics book (Grewar, 1996). The total number of correctly written down spellings was the subject's score (See Appendix 1 on page 47 for the list of spelling items).

The orthographic fluency test was also designed by the researcher and had 100 (10 x 10) items, out of which 25 were non-words, that is, misspelled words randomly located. Pupils were asked to underline as fast as possible the misspelled words or letters that were not real in 5 minutes. Letters with no distinct phoneme in English were part of the unreal letters. The score was the number of correctly identified misspellings less the number of incorrectly identified misspellings including missing ones (See Appendix 2 on page 48 for a copy of this test).

2.3.2 Testing procedures

The screening tests were administered to the whole class at the same time by the class teacher, this was mainly to enhance consistency in the way the sounds and words were pronounced. For the spelling, the teacher said the particular sound or word, which the pupils then had to write down on pieces of paper. With the orthographic fluency test, pupils were given clear instructions that some letters/words were not real and so as the pupils read the words they were asked to spot the words that were wrongly spelt and underline them as fast as possible.

Before commencing training in the 'Literate' programme, the pupils who performed poorly in the above tests were then subjected to a deeper assessment, which was done on a one-to-one basis. Several items were assessed such as (1) Letter sound recognition,
(2) Letter sound production, (3) Letter spelling, (4) Recognition of syllables with a list of Consonant Vowel (CV) structures and another list of Consonant Vowel Consonant (CVC) structure, (5) Spelling of syllables with CV and CVC structure jumbled up,
(6) Oral reading of short words with structures such as VC, VCC, CVC, CVCC, and CCVCC and (7) Spelling of short words with CVC, VCC, and CCVCC structures (please refer to Appendix 3 on pages 49-52 to look at all the test items in the Deeper assessment).

2.3.3 Intervention

The 'Literate' training was conducted in a classroom at the private international school by the researcher and a research assistant who was given a short training on how the game works. The Grade two teacher was informed about the purpose of the study. After the first tutoring session, pupils were able to work independently but the researcher or the assistant always had to be present. The researcher/assistant kept a record of the children's playing time, arranged the sessions and ensured that the children could practice undisturbed. The total playing time over the 8-week period varied from 60 minutes to 96 minutes with an average of 74 minutes. The number of playing sessions varied between 8 and 12, with an average of 10 sessions. Each child had to play on the 'Literate' game for 10-20 minutes for 1-2 sessions per day.

2.3.4 Assessment of the ‘Literate’ training

The ‘Literate’ game recorded everything the player did on the computer through gamelogs. The gamelogs could be analyzed with several computer programs which each had different features and methods of measuring. The general way of interpretation in this study was that 60% performance was equivalent to guessing and performance at or above 95% was considered to be a sign of real knowledge. For research purposes however, children were expected to get 100% before they could move from one level to another while in real intervention the limit is 80%. According to Ojanen 2007, the performance level was set this high because the items in the study were phoneme-letter correspondences that were supposed to be automatic.

2.3.4.1 Graphotable

The Graphotable was developed by Kimmo Teerimaki and it summarizes the playing process into performance scores. It counts right and wrong answers in each trial and gives statistical information on child's performance. It also lists all items in the game and gives the score for playing on that item during a playing session.

When the computer says a sound, the child is then asked to identify that sound and the Graphotable gives information about the child’s first responses to the ‘Literate’ items. A Graphotable result like 6/6/ 18 100% means that when a sound like ‘O’ was presented 6 times, the child gave 6 correct responses and 18 was the number of distractors that were presented during the session. 100% is the child’s performance during that session implying that the child demonstrated that he/she knew the sound very well.

In this study, the Graphotable tells the statistics for the first playing session and the last three playing sessions on an item. The Graphotable also tells the full playing time of the levels and counts the amount of trials.

2.3.4.2 Overview

The Overview program is based on Bayesian probability mathematics and was developed by Janne Kujala. It makes a timeline of the player's intervention, starts a new graph each time a new item starts in the game and draws a graph on the player's performance on all

items. It also shows how long it took to learn different items, because the shorter the line for an item was, the faster the learning occurred (refer to Ojanen 2007 for details).
In this study, the Overview helped to analyse what happened during the intervention and the information beefed up the learning process section and gave more details about player's performance in the outcomes section.
There was however some inconsistency in the Graphotable results and the Overview data and it is not known at the moment which program is more precise.

2.3.4.3 Levelscores

While the previous programs show learning item-wise, Levelscores shows the player's performance on the level-wise. Levelscores draws a simple graph of the performance percentages of playing sessions on each level. These graphs illustrate how easy or difficult it has been for the player to get through a level. When the level has been easy, the line of that level is very short and right around 100%. When the level has been difficult, the line starts from 50% or so and there is much more up-and-downs and also, the line is much longer as it has taken more playing sessions to get the level through.

2.3.4.4 Daisygraph

The Daisygraph answers to the most important question: ‘Is the child able to connect the right sound to the right symbol?’ Daisygraphs draw a simple figure of each item and show how well or bad the player knew the difference between the item and the distractors. In an ideal situation the figure resembles that of a flower.
Usually Daisygraphs makes one gray “petal” for each 20 times when the item and distractor have been presented together. As a result, it is possible to see the development of player's performance. The small numbers outside the Daisygraph tell how many times the distractor has been presented with the item (refer to Ojanen 2007 for details).

2.3.5 Post-test and follow up test

This mainly involved administering the reading tests, which were basically screening measures and the deeper assessment.

3.0 Results

Generally all pupils had a basic idea of alphabet sounds and possessed basic blending skills. In this regard, the pupils were already capable readers although the chosen 8 had some difficulties especially to do with fluency. It is also important to mention here that when playing the 'Literate', pupils found that most sounds were said quite differently on the computer compared to how they know them to be. This affected performance especially in the initial stages because the pupils took a while to adjust to the 'new' accent. To help out with this and also to avoid the frustration of being in the same level for a long time the researcher repeated the sounds after the computer so for a while no headphones were used until the pupils were familiar with the sounds. This was mainly just for the initial stages of playing.

To have an idea of the target sound or words in the 'Literate' game and the different level of play please refer to Appendix 4.

Below are the brief descriptions of the performance on the 'Literate', however results of the deeper assessment in the form of pre-test and post-test are also highlighted. Please note that the only Daisygraphs, Overviews and Levelscores indicated in this paper are those which mainly helped to highlight the learning process.

3.1 Lawiz

A lively and very determined 7-year-old British girl who spoke only English and had 12 sessions of play with a total playing time of 96 minutes. She went up to level 7 and had a total of 1345 trials. She enjoyed the 'Literate' sessions though when not in the mood would simply rush through. Lawiz had a lot of difficulties with the way most words/sounds were pronounced and so needed help.

Initial literacy skills

Performance on the pre-test showed confusions between E and I sounds as well as B and D. Graphotable results showed that initial performance for level 1 was at 100% for all sounds while in level 2 Lawiz had difficulties with P and B, performing at 62% for both sounds. Level 3 was fast and easy while level 4 initially presented difficulties with AM (50%). Initial performance for level 5 presented quite a number of difficulties for Lawiz

with LID having the least score at 66%, while BIN, BIB, and DID had 75% and KID, LIP and PIN were 80%, 93% and 87% respectively. The Graphotable data reveals that in Level 6 the initial performance was quite good with errors only for FAN (66%), MAD (85%) and PAN (87%). Level 7's initial performance from the Graphotable showed a number of difficulties for POD (0%), POND (60%) and NOD (94%).

'Literate' training

The Overview data showed that in level 1, Lawiz identified all the sounds correctly and quickly moved to level 2. Level 2 however showed the need for training with B and P sounds from the onset, as the Graphotable results showed performance to be at 62% for both sounds. Lawiz played in level 2 for 3 days and made a lot of consecutive errors when identifying P and B as a result kept the performance graph in the Overview data on a very low level position until the third day when a number of correct responses where made. It is likely that this is when Lawiz adjusted fully to the accent on the computer and then moved to level 3.

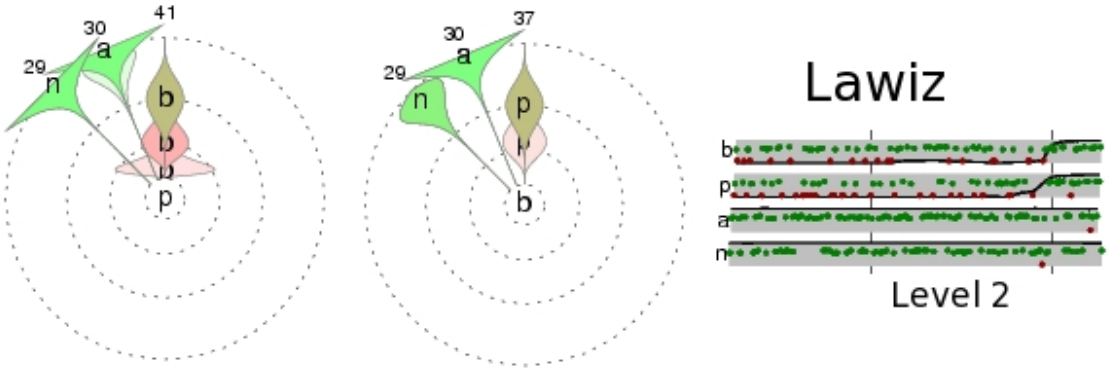


Illustration 2: Lawiz Daisygraph and Overview from phonemes B and P

Level 3 was sailed through very smoothly at 100% performance and soon moved onto level 4 on the same day. Lawiz performed quite well on Level 4 though initially had difficulties identifying AM making initial consecutive errors as it was confused with AN. She later on made an occasional error with AN and then sailed through the level very smoothly with no errors at all. On the fifth day of playing she moved onto level 5 where she made several errors with identifying BIN and occasional errors with words like PIN, BIB, DID and KID for 4 days. The overview data showed that for the first 2 days of playing on this level Lawiz's performance graph for BIN was at average but then in the

last 2 days she learnt to correctly identify BIN making the graph be at the top showing good performance.

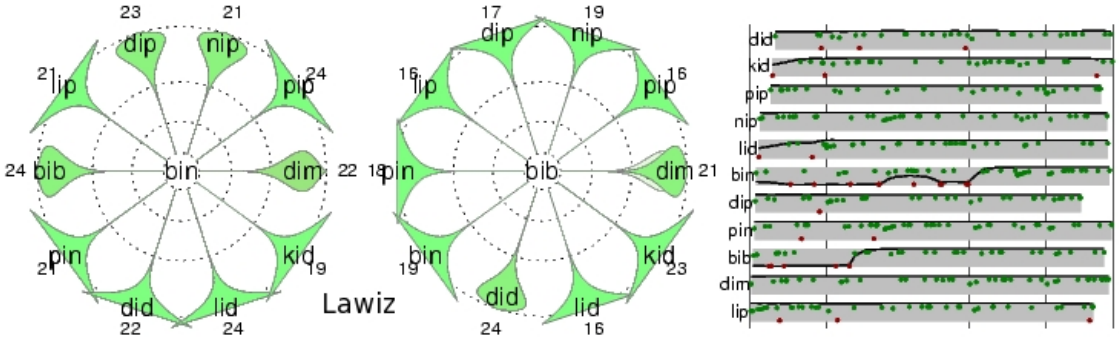


Illustration 3: Lawiz Daisygraph and Overview targets BIN and BIB

Lawiz moved onto level 6 on the ninth day and played quite well but with occasional errors on MAD, DAD, VAN and PAD for two days. On the eleventh day she moved onto level 7 where she generally performed well on most words but for POND and POD. She played in level 7, the highest reached so far, for 2 days and from the onset made consecutive errors for POND and POD with the graph at the lowest level and this only changed on the last day when a number of correct responses were noticed.

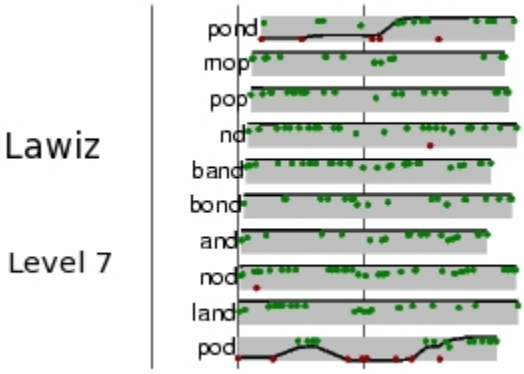


Illustration 4: Lawiz level 7 Overview detail

Outcome

Lawiz already had problems with B/D as well as E/I sounds when playing the 'Literate' as was seen in the pre-test. After playing the 'Literate' however the post-test results showed no major B/D reversals, and only one confusion with E/I sounds was observed.

It can therefore be stated that Lawiz benefited from the 'Literate' as the follow-up results did not show any of the confusions she committed earlier.

3.2 Lisa

A 6-year-old South African girl who also spoke 'Afrikaans' besides English and had 9 sessions of play with 68 minutes of playing time. She went up to level 6 and had a total of 892 trials.

Initial literate skills

The pre-test showed that Lisa had a number of B/D problems in some reading and writing tasks. The first session of playing the 'Literate' in level 1 was at 100% except on F (80%). A similar pattern continued in level 2 where only P scored 60% and probably needed training to distinguish it from B. Level 3 was smoothly sailed while level 4's initial performance only presented difficulty for ON (71%). Her initial performance on level 5 was good with only BIB and BIN having 66% and 90 % respectively. For level 5 the first session of play was 0% for BAD and 83% for DAD.

'Literate' training

The Overview results showed that Lisa's performance was good though she made a number of consecutive errors identifying F. The Daisygraph further shows that Lisa confused F with V probably because of the similar manner in which they were pronounced in the game. On the same day she quickly moved to level 2 and identified most sounds very well (100% performance) except for P (60%). The Overview table below shows how Lisa continuously made a number of consecutive errors before finally learning to differentiate P from B, which was only on the second day of playing. Level 3 presented no difficulties for Lisa at all, as she quickly correctly identified the sounds and moved onto level 4 where her initial performance on most sounds was at 100% performance except for ON (71%). The Daisygraph shows that this was later confused with AN. Lisa played on level 4 from the second through to the fourth day as she made isolated consecutive errors when identifying words like AN and AM before eventually

playing well and moving onto the next level. Lisa played level 5 on the fifth day and initially played very well with identifying most sounds.

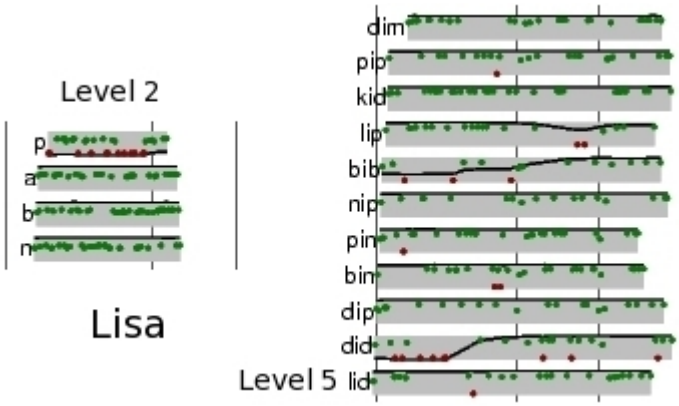


Illustration 5: Lisa Overview detail for Levels 2 and 5

The Overview data shows how later Lisa made a number of consecutive errors on DID with the graph right at the bottom as is on the illustration above. The Dasiygraphs below, however also show how the some words were confused during the playing session, for example DID and BIB. The Overview data also shows other isolated errors committed for words like BIN, PIN, LID, PIP as well as BIB where the graph was halfway showing average performance. The difficulty experienced with identifying words with B, D and P could be a reflection of the difficulty noted in the pre-test as well as in level 2 of playing the 'Literate'. On the sixth day the performance graphs for all the words had improved tremendously though a few errors were noticed for words like DID and LIP. This is in spite of the problems Lisa had with the mouse on this day. The seventh day of playing in level 5 showed a lot of improvement as only one error was noticed with DID and thereafter Lisa moved onto level 6. As earlier alluded to, initial performance on this level showed that Lisa identified most words very well except for DAD and BAD that were confused with BAD and PAD respectively (see Daisygraph illustration below). Later on, other isolated errors were also noticed with words like MAD and PAL though the general performance was good. This however was the last day of play.

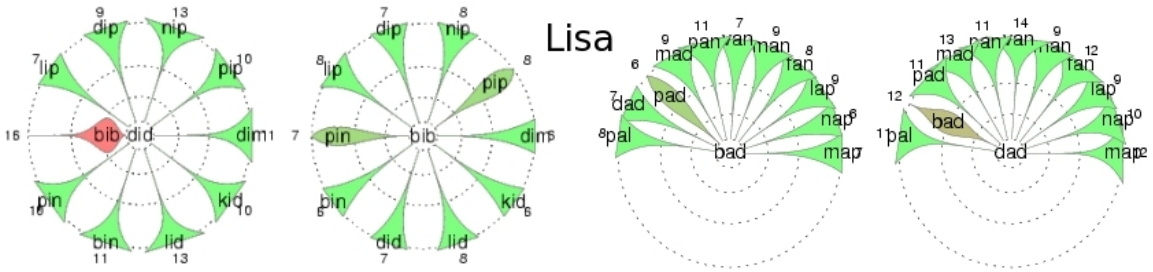


Illustration 6: Lisa Daisygraph detail showing targets DID, BIB, BAD and DAD

Outcome

Lisa had B/D difficulties when she started playing the 'Literate' as was indicated in the pre-test and so needed training with B. Letter D did not present any problems on the 'Literate' though a number of difficulties were seen for words starting with B and D in level 5 and 6. The post-test did not show any errors with B/D, as it is possible that Lisa learnt to identify B after playing the 'Literate', however in the follow up results a B/D problem was reflected once.

3.3 Mwansa

Is a 6-year-old Zambian girl who spoke English even when at home. She had 8 sessions of play with 59 minutes of playing time and went up to level 7 with a total of 888 trials. Mwansa enjoyed working quietly and always concentrated on a task.

Initial literate skills

The pre-test showed that Mwansa confused I/E as well as B/D sounds. She read JI as JAI, PE as PI, ZE as ZI and wrote BA as DA and TED as TEB. The Graphotable showed that the first session of play in level 1 was excellent except for I (40) %. The Graphotable showed that Mwansa's first session of play for level 2 was at 100% while level 3 presented difficulty with L at 40%. Level 4 showed 100% initial performance while level 5 presented difficulties for DIM (90%), NIP (85%) and BIB (0%). The initial performance for Level 6 was at 100% for all the words while level 7 was 88% for POD and BOND with BAND having 75%.

'Literate' training

The Daisygraph in the illustration below showed that Mwansa had a lot of difficulties identifying I especially when it was presented with distrators like V.

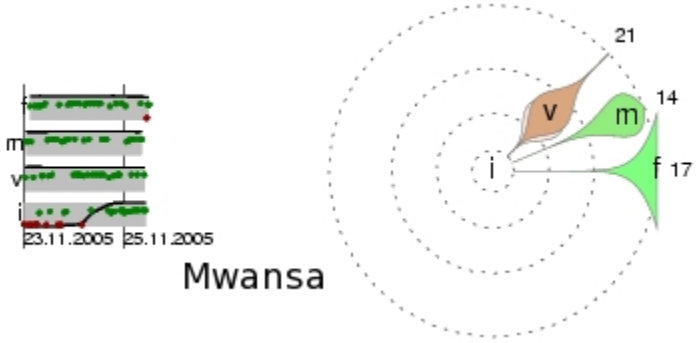


Illustration 7: Mwansa Overview detail for Level 1 and Daisygraph detail for target I

The Overview table in the illustration above actually revealed that Mwansa played in level 1 for 2 days as the performance graph for I was at the bottom with a lot of consecutive errors for the first day. On the second day the performance graph for I improved tremendously with no errors recorded though one error for F was noticed. The good performance enabled Mwansa to move onto level 2 where she sailed through quite easily and in no time moved to level 3 and later on level 4. Her performance on level 4 was equally good though isolated errors for AM and IN were noticed once and the Daisygraphs revealed that these were hard for Mwansa to identify when presented with distractors AN and IF respectively. Mwansa ascended through the levels quite fast and on the second day of play moved to level 5 where she played up to the fourth day. Her initial performance in level 5 was generally good with isolated errors for words like NIP and DIM. However Mwansa also made a lot of consecutive errors on BIB performing at 0% with the graph right at the bottom through out the first day of playing (as is shown in the Overview illustration below).

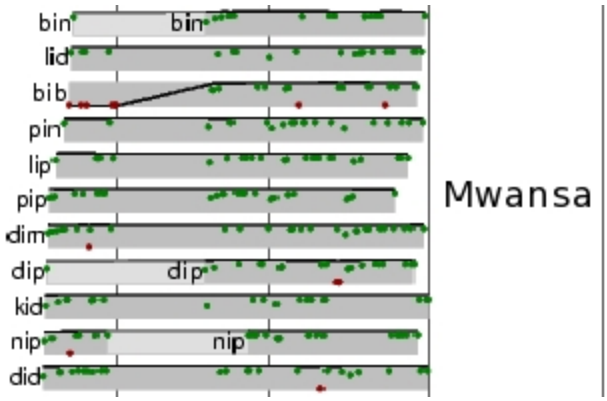


Illustration 8: Mwansa Overview detail showing performance in Level 5

On the second day of playing in level 5 Mwansa did not make a lot of errors though did not go up the levels of play. On the third day of playing in level 5 other isolated errors with DID, DIP and BIB were made though she managed to move onto level 6. So on the fifth day of playing the 'Literate' Mwansa was on level 6 and her performance for most words was at 100% level except for a few words like PAN and BAD. The performance graph for PAN was right at the bottom but later on improved such that by the sixth day it was right on top. Day six saw Mwansa moving onto level 7 where she generally performed at 100% on most words except for isolated errors on POD, BAND and BOND.

Outcome

The pre-test showed that Mwansa had difficulties distinguishing between E/I as well as B/D sounds. After playing for 2 days Mwansa learnt to identify I from distractors like V and did not have difficulties with B/D, though words with B and D in level 5 presented some difficulty. The post-test showed that she did not fully learn to distinguish I from E as such errors continued in words like PE, JI and KI that then became PI, GI and KE respectively. Like the post-test, the follow-up test showed no reversal problems for B/D sounds but revealed slight I/E problems especially in the examples given above.

3.4 Aolo

Is a clever 6-year-old Italian boy (but mainly spoke English) who seemed competent with computer games. He always enjoyed the 'Literate' and played very competitively.

He had 8 sessions of play with total time of 78 minutes. He went up to level 8 and had a total of 1098 trials.

Initial literacy skills

The pre-test results showed that Aolo confused I/E sounds in reading words like DID and DIM, which were then read as DED and DEM respectively. Other errors made included reading PE as P and BA as BE as well as writing BAT as DAT and KI as KE. The Graphotable shows that Aolo played level 1 at 100% initial performance while levels 2 and 3 presented difficulties with P (70%) and D (66%) respectively. Initial performance for level 4 was fast and easy at 100% performance while level 5 presented a number of difficulties for DID (75%), DIM (66%), BIN (90%) and PIN (87%). In level 6 the initial performance also seemed a bit difficult as a number of errors were made with BAD (90%), DAD (83%), MAN and MAP at (88%), PAD (71%) and Pan at (80%). Level 7's initial performance revealed few errors such as BOND (80%) and POND (66%) while the Graphotable further showed that in level 8, initial performance for PLOD and BLIP was at 66% and 0% respectively.

'Literate' training

While Aolo played level 2 at 100% performance for most sounds, his initial performance for P was 70%. Overview data however reveals that later Aolo made few consecutive errors when identifying P and the graph was at the bottom for a while. The Daisygraph further shows that P was mainly confused with B. It is worth noting that Aolo was always fast when playing and adapted to the sounds on the 'Literate' quite fast with a sole purpose of moving to a higher level. As a result, on the first day of play, Aolo quickly learned to identify P and moved to level 3 where he correctly identified the sounds except for D (66%). D seemed to have been confused with L though this error was only committed very in few instances. On the second day of playing on the 'Literate' Aolo moved to level 4 where he committed no errors and soon moved onto level 5. As is indicated in the Overview illustration below, this level paused some difficulty for Aolo making him take a number of days on it.

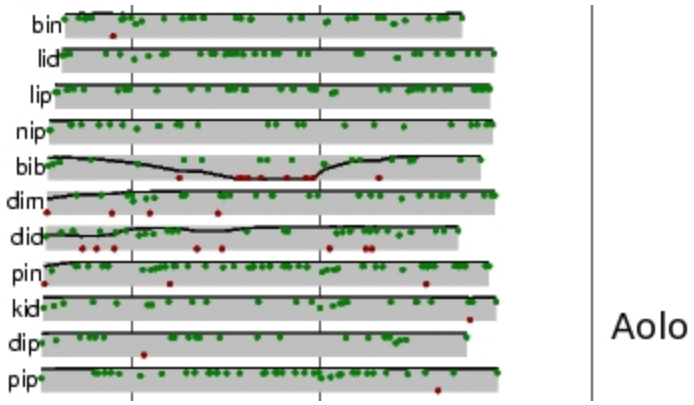


Illustration 9: Aolo Overview detail showing performance in Level 5

Initially he played quite well with only some minor errors on PIN, DIM, BIN and DID as can be seen in the illustration above. On the first day of playing in level 5 the performance graphs were generally on top except for DID which seemed to be at average.

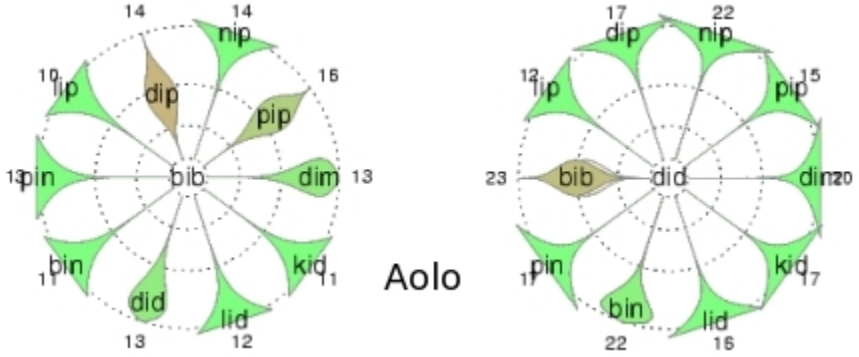


Illustration 10: Aolo Daisygraph detail showing targets BIB and DID

The second day of playing level 5 show isolated errors for DIP, PIN, DID and DIM while a number of consecutive errors were noticed for BIB and the performance graph went right to the bottom. The type of words for which BIB was confused with are reflected in the Daisygraph above. By the third day, the number of correct responses for BIB improved tremendously making the performance graph to gradually get to the top. Although isolated errors were noticed for DID, PIN and PIP, Aolo managed to move onto level 6 on the fourth day of playing on the 'Literate'. He generally played well but it was also noticed that Aolo always rushed to click on the answer and because of not being steady, made unnecessary errors when identifying BAD, MAN, and MAP. Most of the isolated errors made in level 6 were incurred on the first day of playing in this level while

on the second day only one error was made with MAN and later on Aolo moved to level 7. He played in level 7 from the fifth to the sixth day of playing on the 'Literate' and initially played very well with only two isolated errors for POND (66%) and BOND (80%) confusing them with POD and POND respectively (see Daisygraph below). Later on, isolated errors were again noticed for words like BOND, BAND and POND.

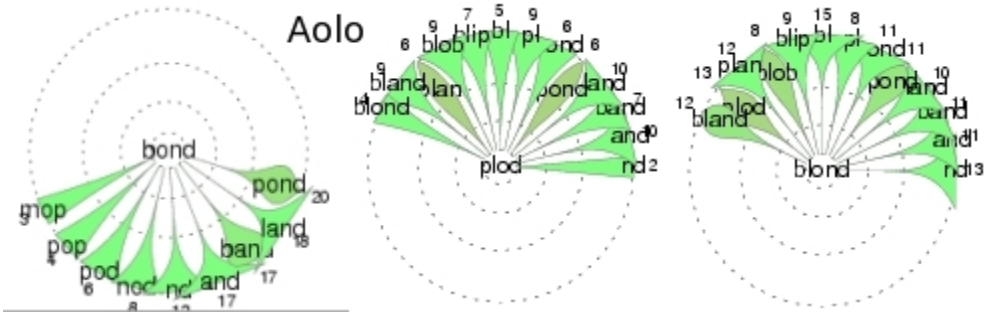


Illustration 11: Aolo Daisygraph detail showing targets BOND, PLOD and BLOND

On the sixth day Aolo managed to move to level 8 and he initially played quite well with only a few errors for PLOD and BLOND which were confused with PLAN/POND and POND/BLOP/PLOD respectively (see Daisygraph above). However on the seventh day of playing, a number of isolated errors with PLAN, BLOB, PLOD, BLAND, BLIP and BLOND were made. Aolo was not keen to play on the 'Literate' anymore as he perceived level 8 to be hard and did not like losing.

Outcome

Aolo had a lot of I/E confusions at the start of the game as was indicated in the pre-test, this was however difficult to establish with the 'Literate' as E sound was never a target to be learnt. It is worth noting that Aolo took a while on level 5 which had a lot of words with I, anyhow this level also had a number of words with B and P that were not distinctly pronounced. The post-test showed a reduction in the I/E confusions, though these confusions were still persistent in the follow-up test like PE becoming PI and DEN as DIN when reading or writing. This shows that Aolo did not fully learn to distinguish I/E sounds but adapted to the P/B sounds from the 'Literate' very well.

3.5 Chi

This is a 7-year-old Zambian girl who speaks both English and Cinyanja. Chi had 10 sessions of play with a total playing time of 75 minutes. She reached up to level 5 and had 1057 trials.

Initial literacy skillls

The pre-test revealed that she had difficulties with J and G, as well as I and E sounds making her read ZE as ZI, TED as TID, and write JI as GI, TED as TAD and BIT as BET (refer to Appendix 3 on pages 49 - 52 for the word types). The first session of play for level 1 was at 100% performance according to the Graphotable results, however level 2 presented difficulties with B (75%) and P (62%) showing need for training. Initial performance in levels 3 was 100% and level 4 was equally good except for AN (75%). Level 5 however presented a number of initial difficulties with BIN (75%), DID (66%), DIM (75%) and DIP (0%).

'Literate' training

Chi recognised the letters in level 1 at 100% performance and quickly moved to level 2, which however presented a number of difficulties for her. She identified some sounds correctly though B and P paused considerable difficulty from the start with performance of 75% and 62% respectively. The Daisygraph below shows how P was confused with B, while B was confused with P.

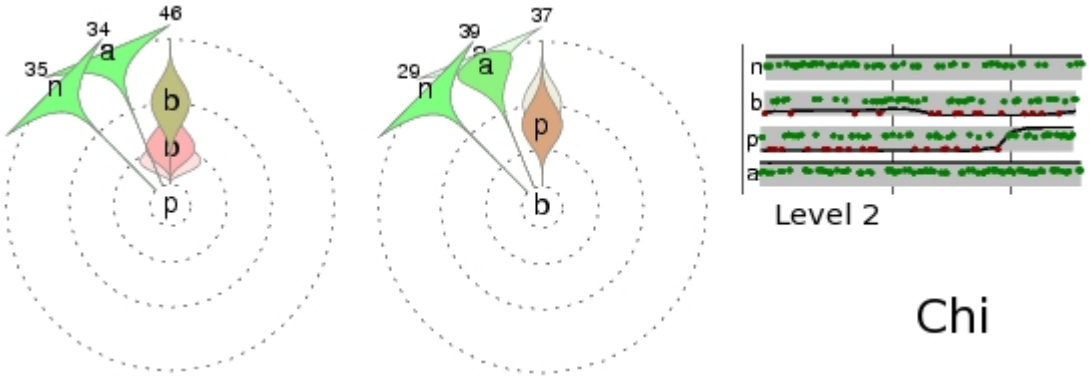


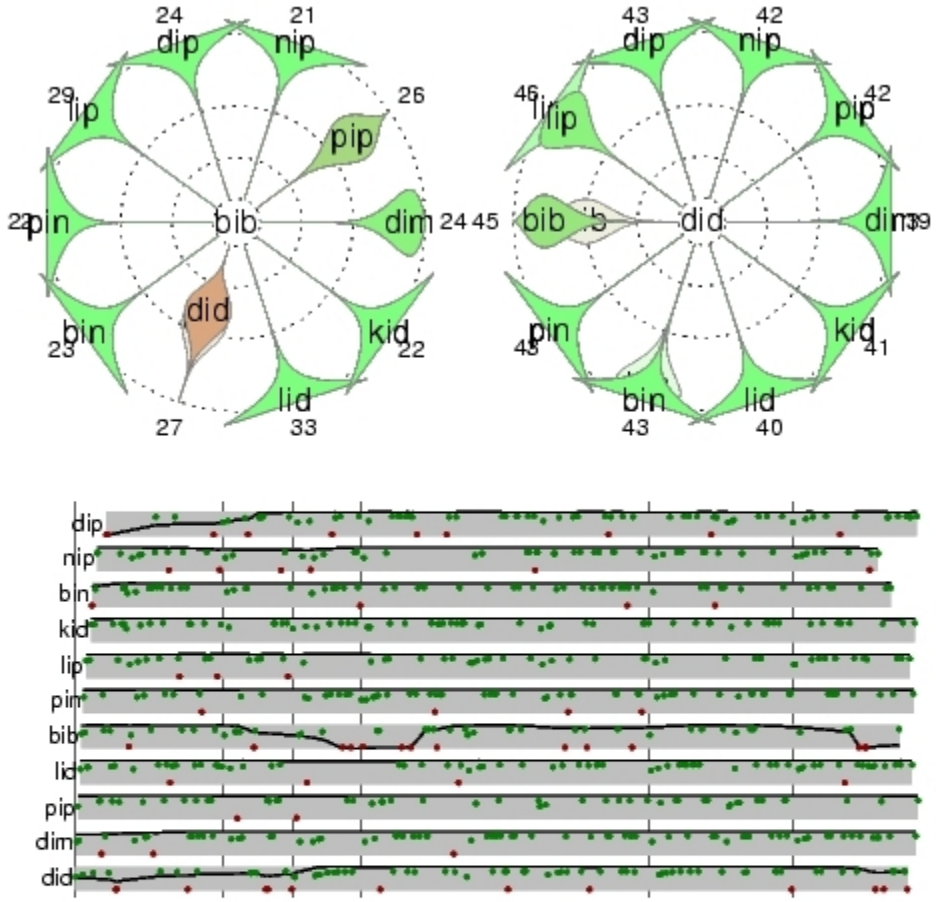
Illustration 12: Chi Daisygraph detail showing targets P and B as well as Overview detail showing performance in Level 2.

The performance graphs on the Overview illustration for both B and P were right at the bottom from the first through to the second day with a lot of wrong consecutive responses and some oscillations between right and wrong choices (as can be seen above). On the third day of playing in level 2, Chi's performance on identifying P improved tremendously making the performance graph to go right to the top. The performance graph for B however continued to be at the bottom with some wrong consecutive responses and this affected Chi's concentration, as she seemed fed up of being in level 2. Eventually however, Chi managed to move to level 3 on the third day of playing on the 'Literate'.

In spite of the minor error with AN (which was confused with 'IN') for level 4, Chi sailed through levels 3 and 4 quite easily and did this on the same day of play.

On the fourth day Chi moved to Level 5, which presented a lot of difficulty for her probably because it had a lot of words with P and B. She played in level 5 for 6 days (see Overview illustration below) and was eventually frustrated, discouraged and so fed up of playing in the same level. Initially her performance, according to the Graphotable results was at 100% for most words except DIP (0%), DIM (75%), DID (66%) and BIN (75%). The Overview illustration below, further show that performance graphs for all the words were at the top except for DIP, which eventually also made improvement. The Daisygraphs below also highlights the words that BIB and DID were confused with.

On the second day playing in this level only three occasional errors were noticed for DIP, BIB and PIP. By the third day a number of consecutive errors were noticed for BIB making the performance graph to be at the bottom. Meanwhile a few isolated errors were seen for LID, PIP, NIP and DIP but the performance graphs were not affected. Being a low achiever, Chi found the 'computer' mean in that it did not appreciate her efforts of performing over 90% (see the Levelscore illustration below with over 95% performance for DIM) as the teachers would normally do in the classroom. This implied Chi had to play in the same level until she achieved 100% performance.



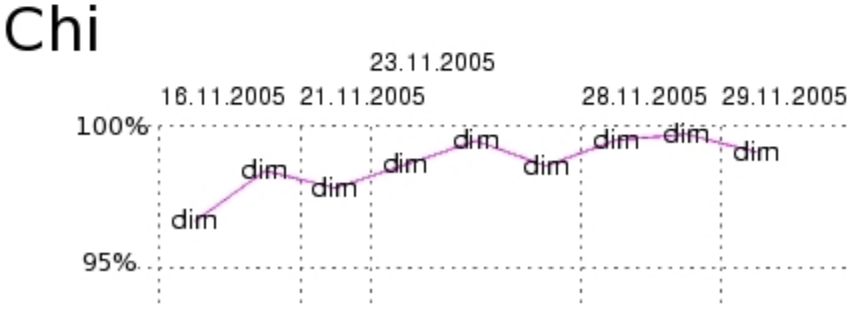


Illustration 13: Chi Daisygraph detail showing targets BIB and DID, Overview performance for Level 5 as well as Levelscore detail for DIM

By the forth day, gradual improvement was seen with BIB, as the graph was at the top however isolated errors on some words continued. The fifth day only had 2 errors but there was no moving to another level. By the sixth day Chi was fed up of losing and was

not keen to play 'Literate' anymore as she made a number of isolated errors on some words and also made consecutive errors on BIB causing another drop in the graph.

Outcome

Although no B/D errors were seen in the pre-test, they were noticed in the all post-test results. However when playing the 'Literate' confusions between P and B were persistent especially on levels 2 and 5. Errors with I/E sounds seen in the pre-test continued through to the follow-up test, showing that Chi did not learn to discriminate these sounds although 'E' was not really part of 'Literate' training. On a good note, the B/D reversals had reduced remarkably in the follow-up test results showing only one error. This improvement in follow-up test results could also be attributed to phonics tasks from class.

3.6 Juju

A very determined Lebanese boy who was keen to learn new concepts and had 8 sessions of play with total playing time of 61 minutes. He went up to level 6 and had a total of 981 trials. Juju mainly spoke Lebanese at home and occasionally learnt Arabic when at the mosque. He enjoyed the 'Literate' sessions so much that he didn't mind leaving the class though, he would occasionally work really fast to get back to class. He had a lot of difficulties picking some sounds from the 'Literate' such as, B and L.

Initial literacy skills

The pre-test showed that Juju did not really seem to know the I/E sounds and made a number of errors with vowels reading JI as JA, PE as PA, KI as KA, ZE as ZA and wrote BAT as BET, BIT as BUT and PIN as PUN. On the first playing session of the 'Literate' he performed quite well as he identified all the sounds correctly except for F (83%). In level 2 Juju's performance was good for most sounds except P where he had 29%. He quickly sailed through levels 3 and 4 at 100% performance. His first playing session for level 5 seemed equally good except for BIB where he had 66%.

'Literate' training

Although it was observed in other Daisygraph illustarions that Juju confused F with M, it did not really imply that he needed training with F as he did well on other sessions. Level 2 is what seemed to have given Juju a hard time and needed training with discriminating B and P sounds (see the confusions he made in the Daisygraphs below).

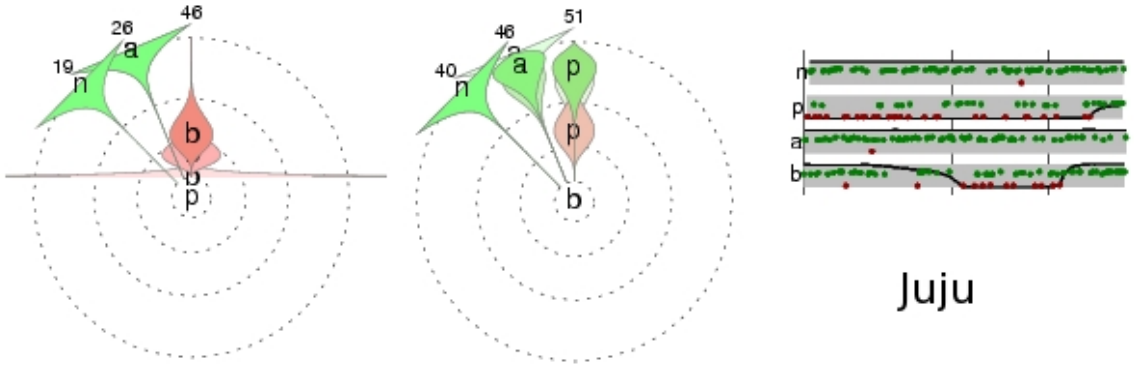


Illustration 14: Juju Daisygraph detail showing targets P and B as well as Overview performance in Level 2

Juju played on level 2 for 3 days and made consecutive errors with P making the graph to consistently be at the bottom as is on the Overview illustration above. Although occasional errors were made with N and A, other consecutive errors were also made with B. Performance on B worsened on the second day of playing in this level as the graph dropped to the bottom through the whole day. On the third day of playing in level 2 however, remarkable improvement was seen on B as well as P making the graph to go up again.

On the fourth day Juju sailed through level 3 and 4 quite easily performing at 100% on all the words and sounds. He then proceeded onto level 5 where he made a number of errors with words like PIN, BIB, and DIP, DID, PIP, DIM, and BIN (see Daisygraphs below).

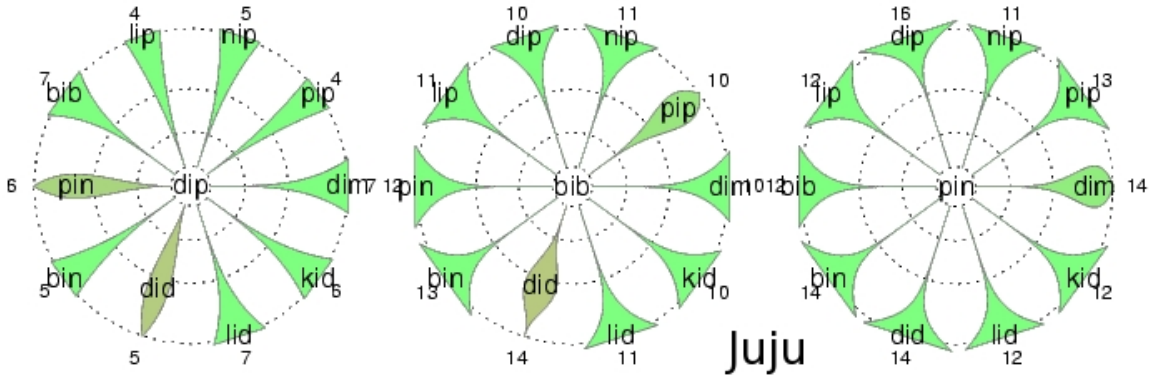


Illustration 15: Juju Daisygraph detail showing targets DIP, BIB and PIN

He played on the same level for 2 days and eventually managed to play well enough to move to level 6 on the sixth day and was on this level for 3 days. He did not make consecutive errors but occasional errors for words like BAD, PAN, and PAD resulted in oscillations in performance making it hard for him to reach 100% performance.

Outcome

The pre-test showed that Juju was not so sure of some sounds and could not really distinguish between A, E and I vowels in reading and writing tasks. In the 'Literate' however, he seemed to have difficulties with distinguishing B and P sounds, this was also reflected on Level 5 that had a lot of words with P, B and D as well as vowel I. The post-test results highlighted confusions with B/D while the uncertainty with I/E was persistent reading JI as JAI implying that he did not learn these sounds even on the 'Literate'. The follow-up test showed a slight improvement with identifying I though he made mistakes such as writing JI as JE.

3.7 Deen

A clever 6 year old, Zambian girl of Asian origin (only speaks English) who really enjoyed the 'Literate' game such that she still asked about it at the time of writing this paper. She had 10 sessions of play and had a total of 81 minutes. She went up to level 7 and had a total of 1258 trials. She also had difficulties identifying the sounds on the 'Literate'.

Initial literacy skills

The pre-test results showed that Deen made several I/E confusions in both reading and writing tasks for example wrote FIG as FEG. Deen apparently had problems identifying the sounds like F, M and V the first day she played the 'Literate' and generally performed at less than 65%. The first session of the Graphotable showed that in level 2 Deen's performance was at 100% except for sounds B and P, which had 81% and 66% respectively. Though she sailed through level 4 smoothly, level 3 presented difficulties especially with letter D while in level 5 she had difficulties with identifying DIM (68%).

'Literate' training

The Daisygraph and Overview illustrations below show that Deen had difficulties identifying all the sounds in the first level. As can be seen from the Overview illustration below, Deen played in level 1 for 2 days before she proceeded onto level 2. This could be due to the apparent difference in the way the sounds on the 'Literate' were said because the pre-test did not show any signs of difficulty with such sounds except for I.

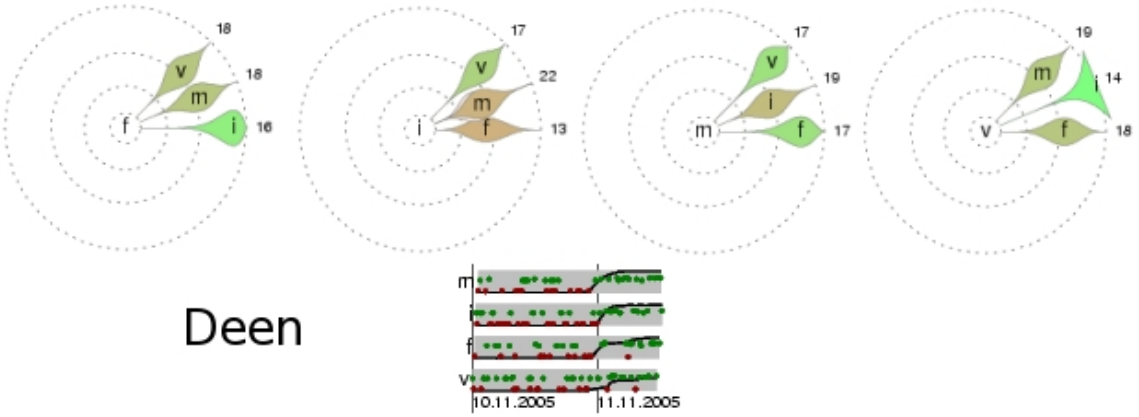


Illustration 16: Deen Daisygraph detail showing targets F, I, M and V as well as Overview performance for Level 1

Deen also played in level 2 for 2 days and did not have any difficulties with identifying N and A sounds. She however had a lot of difficulties identifying P (see the Overview illustration below) seeing the performance graph was right at the bottom for most part of the 2 days and only made correct consecutive responses towards the end. The Daisygraph below also shows the confusions made when identifying P.

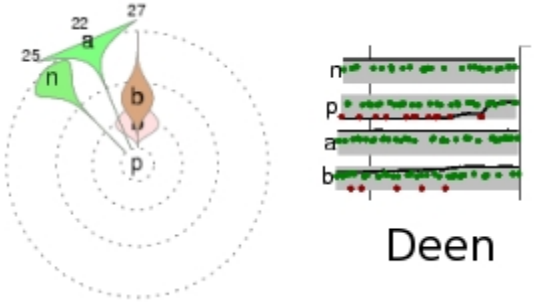


Illustration 17: Deen Daisygraph detail showing target P and Overview performance for Level 2

The performance graph for B shows that, a number of isolated wrong responses were made but this did not affect the performance graph as it was maintained at the top. On the fourth day of playing Deen was on level 3 and the Graphotable revealed that she identified K, O, and D at 100% performance while L was at 80%. It is likely she still had accent problems. On the same day however she moved onto level 4 and sailed through quite smoothly as she performed at 100% on all the words. On day 5 she moved onto level 5 which seemed difficult for her as she played on this level for 4 days.

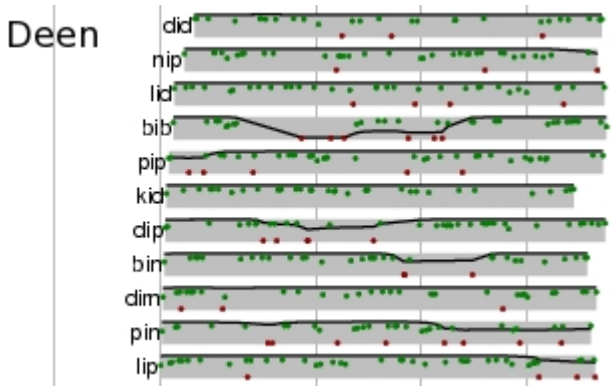


Illustration 18: Deen Overview detail showing performance in Level 5

At first her performance on most words was very good except for DIM (refer to Overview illustration above). For the next three days however she also started making occasional errors on other words such as BIB, BIN, DIP and PIN making the performance graph to drop slightly before finally being at the top. On the eighth day she moved onto playing in level 6 and was at 100% performance on most words except for MAP and NAP at 80% and 60% respectively. The Daisygraph information showed that she confused MAP with MAD and NAP with LAP when playing. Reference to the

Overview illustration further revealed that she made three consecutive errors with MAP and several consecutive errors with NAP before finally making correct responses. On the ninth day she moved onto level 7 where she played for 2 days and made consecutive errors on POD and POND while also making isolated errors on other words such as BOND, BAND and MOP. The Daisygraph data revealed that she confused POND with BOND and LAND whereas POD was confused with LAND probably because she was playing fast.

Outcome

Deen had difficulties distinguishing E and I in the pre-test and certainly needed training with I. Though a lot of time was spent on level 2 when distinguishing P and B sounds, it is unlikely Deen needed training in this, as she did not show any reversal errors on the pre-test. Deen also took a long time on level 5 which had a lot of words with P, B and D probably due to the way these sounds where said on the 'Literate'. The post-test showed slight improvement with E/I implying she had learnt I quite well but not well enough to distinguish it from 'E' as the errors continued in the follow-up test where she consistently wrote I as E and read words like PE as PI.

3.8 Hafy

A quiet Indian girl who mainly spoke Gujurati (Indian language) at home and also went to the mosque school regularly to learn Arabic. She had 9 sessions of play with 61 minutes of playing time. She went up to level 6 and had a total of 1067 trials.

Initial literacy skills

In the pre-test, Hafy had slight problems discriminating between E and I as a result read PE as PI, KI as KE and difficulties differentiating J and G reading JI as GI. On the first session of playing on the 'Literate', she identified all the sounds correctly but had slight problems with F. Level 2 seemed fast and easy but then she had problems identifying letter D (57% performance according to the Graphotable results). The first session of level 3 was smooth sailing while level 4 presented slight problems with the word AN (80%). Level 5's first session of play did not present much difficulty though identifying

words like PIN and PIP was at 87% and 85 % respectively. In level 6 Hafy started off very well on most words although with a performance of about 80% for a few words and 66% when identifying MAN.

'Literate' training

The Graphotable results indicate that Hafy's performance in level 1 was at 100% for all the sounds except for F, which was confused with V according to the Daisygraph data. She however managed to finish playing level 1 on the first day of play. On the second day Hafy played in level 2 and performed at 100% with all the sounds in that level except for P (57%) where she made a lot of consecutive errors keeping the graph at the bottom. The Dasiygraph below showed how P was mainly confused with B though eventually she managed to adapt to the way the sounds were pronounced and moved onto level 3. Hafy played in level 3 through to the third day and made no errors therefore quickly moved to level 4. Initial performance in level 4 was very good (100%) for most words except AN (80%), which she had difficulties identifying when it was presented with distractor AM. Later on however other isolated errors were noticed with ON, IF, IN as well as AN, although the graph was maintained at the top for all these words and so on the fourth day Hafy moved to level 5. She initially played pretty well and made only a few errors with PIN, BIB and PIP though later in the next couple of days she made a number of consecutive errors with BIB.

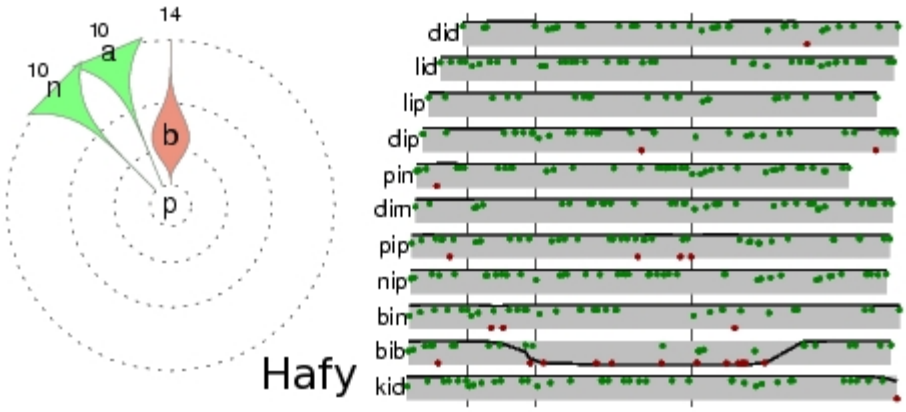


Illustration 19: Hafy Daisygraph detail showing target P and Overview performance for Level 5

Hafy complained of hearing ‘BIB’ as ‘PIP’ making the performance graph to be right at the bottom (see Overview above) before she eventually adapted to the ‘new’ sound and made correct responses that is by the sixth day of playing on the ‘literate’. She later moved onto level 6 which was her highest level attained and played in this level up to the seventh day. Level 6 was started on a good note but with a few errors for BAD, MAN, NAP and PAN. The Daisygraph illustrations below revealed that BAD was confused with PAD and MAD, while MAN was confused with MAD and PAN was confused with BAD and PAD. The Overview data further indicated that the performance graph for ‘MAN’ actually started on a very low level but later on picked up and was at the top up to the end of playing. However a number of isolated errors were later noticed for words like PAL, MAD, NAP, BAD and PAD. Actually the performance graph for PAD dwindled steadily all the way to the bottom especially on the last day of playing.

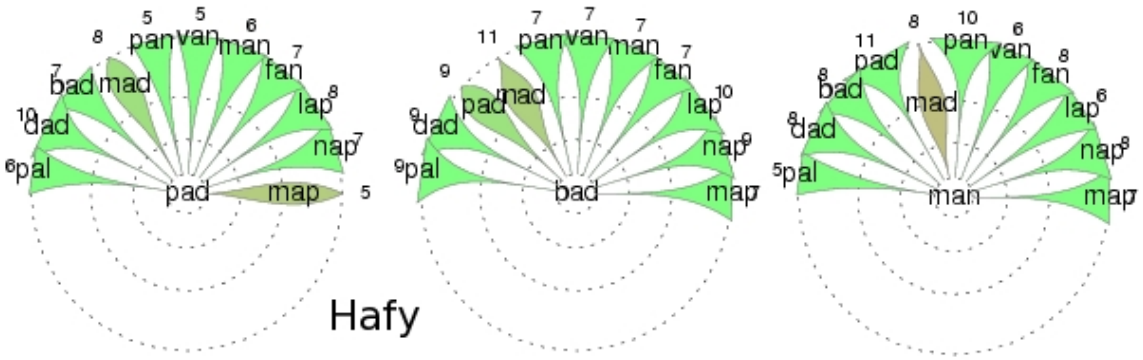


Illustration 20: Hafy Daisygraph detail showing targets PAD, BAD and MAN

Outcome

Although a lot of E/I errors were seen in the pre-test, Hafy did not have problems identifying I in the ‘Literate’. The post-test however showed that she continued reading PE as PI and ZE as ZI implying that Hafy did not reliably learn to distinguish between I/E in words and so did not really benefit from the ‘Literate’. Problems with the identifying P and B were seen in levels 2 and 5 but seeing that this was not reflected in either the pre-test or post-test it is likely that the errors were due to the way these sounds

were pronounced on the 'Literate'. Hafy moved to another school at the time the follow-up test was conducted and so had no results for this.

3.9. Summary of the Results

The case stories of these eight children highlight several positive experiences on the 'Literate' game. It is worth noting that initially, all the children were keen to play the 'Literate' and generally progressed very well through levels. Some pupils like Mwansa and Aolo were generally very fast as they got to highest levels within a very short period of time.

Pupils with first languages that had different orthographies from English such as Lisa (Afrikaans), Chi (Cinyanja), Hafy (Gujurati) and Juju (Lebanese) did not go so high in the levels as they only went up to 5 and 6. On the other hand pupils who had English as their first language (Mwansa, Lawiz, Deen and Aolo), all seemed to have attained the highest levels of play that is 7 and 8.

When playing the 'Literate' most pupils experienced a lot of difficulties in the levels 2 and 5. In level 2, all the pupils except one found it hard to distinguish P from B. They committed a lot of consecutive errors making them play level 2 for at least two days. In level 5, identifying BIB seemed difficult for most of the pupils except one. Although a number of errors on other words starting with D, such as DID were noticed, the performance graph for most pupils was lowest when learning to identify BIB. To most pupils there was no clear distinction in the way B and D sounds were said, resulting in a lot of errors that were committed for most words in this level. Furthermore when we look at the general performance in level 3 where target D did not have confusing distractors like B, very few errors were committed.

Although the pre-test showed that most pupils had difficulties differentiating between E and I sounds most of them did very well in level 1 where I was a target item. However it is important to note here that for the target I, E was never presented as a distractor that probably explains why most of them had no difficulties identifying I. When playing in level 1 however, half of the pupils had difficulties distinguishing between F and V sounds when F was presented as a target and V was a distractor. As with the P/B situation, the F and V sounds had very little difference in the way the sounds were pronounced which

was mainly a problem with English version of the 'Literate' game. This was mainly the initial problem with this particular English version of the 'Literate' seeing the speaker in the game had a 'Zambian English' accent with different stresses and tone.

In level 4 not many errors were committed although half of the pupils made isolated errors confusing AN with AM, while only a few pupils confused AN with ON when one of these words was presented as a distractor.

As has already been alluded to level 5 was tricky for all the pupils with most of them making isolated errors as they played, implying the performance was did not easily reach 100% but was always above 85%. This factor made the 'Literate' unfriendly and a source of frustration when playing because it was observed that the 'Literate' only regarded 100% performance as excellent and never 90% or even 95%. Level 5 is where most of the pupils got fed-up of trying hard and for pupils like Chi who could not go beyond this level, by the fifth and sixth day of playing she was not keen to play anymore and usually preferred to go to class much earlier than usual. Like Chi, Juju also developed a feeling of indifference towards the game when he did not seem to cross over to level 6 soon enough, though he eventually reached 100% performance.

Level 6 was the highest level reached for Juju, Hafy and Lisa where their general performance was mainly that of committing isolated errors and as a result not reaching the 100% mark. However Hafy also had a number of consecutive errors with identifying PAD. As a result of committing constant isolated errors when playing, most pupils remained in level 6 for two days whereas, Mwansa and Deen also had a number of consecutive errors on some words before reaching 100% performance.

As the level of play became higher the number of distractors also increased and this became a bit difficult for some pupils because in a bid to play faster they made more isolated errors. Aolo spent three days in level 7 before moving to a higher level, while Deen, Lawiz and Mwansa could not go beyond this level.

Aolo complained of level 8 words being difficult mainly because the words were much longer and the number of distractors also increased. This made the act of blending the sounds to eventually read the words more difficult since the 'Literate' expected the players to be faster.

3.9.1 Performance pattern

It is important to note here that for some pupils the problems they experienced continued through the playing session and were still reflected in the post-test results implying that the children did not learn the common tricky sounds which in this case were I and E and could not differentiate between B and P.

For example, Aolo continued to have I/E problems though he did not indicate much B/P difficulties in the follow-up tests. Chi is another example, who continued experiencing difficulties in discriminating between I/E and B/D from the pre-test through to the follow-up test and did not show much improvement. Though Mwansa's case is very similar to that of Chi, that is, with B/D problems and I/E confusions reflecting in the pre-test she did however improve on discriminating between B and P as these problems were not seen in the post-test and follow-up test. She however still had few I/E problems in post-test though that was only reflected very slightly in the follow-up test results.

Juju had B/D and B/P difficulties when playing the game and also showed I/E problems in the pre and post-tests. However he did show some slight improvement in the follow-up test results but still wrote JI as JE, PE as PA!

Lawiz was an exceptional case in this study as she showed remarkable improvement. Though she initially had B/P problems when playing the game and also showed both B/D and I/E difficulties in the pre-test, the post-test results indicated few B/D and I/E problems while in the follow-up test none of this was reflected.

Some pupils like Lisa, Deen and Hafy could not discriminate between F and V sounds as well as B and P sounds. Though Deen and Hafy did not show B/D reversals in the pre and post-tests, they experienced I/E confusions, which continued to reflect in the post-tests, though to a lesser degree. One interesting feature about Lisa is she was the only one who did not have any I/E problems in this group, though she had B/D problems in the pre-test which where not reflected in the post-test but once in the follow-up test hence showing great improvement, more in the lines of Lawiz.

3.9.2 Explaining the pattern

The persistent confusion of I/E sounds highlighted in most of the pre and post test data shows that this problem was not just for pupils from a non-English speaking background but also those from strict English backgrounds referring to the fact that the problem is more in the orthographic nature of the English language as has been alluded to earlier in the introduction (McGuinness, 2004). There is no one-to-one mapping of the letter name and its sound because in English one letter may have two sounds and has rules to follow on when to use which sound. For example letter E at times says /e/ (as is in BED) and at other times says /i/ (as is in BE). Furthermore, spelling and pronunciation patterns are often contextually determined (Liberman & Shankweiler, 1979). This implies that the problems are experienced by a wide number of early readers worldwide but then since this group comprised poor readers who generally have difficulties with the sound variations the problems were even more highlighted.

The consistent B/D/P problems highlighted are also a common feature especially among poor readers who have visual problems especially regarding d/b/p and usually tend to reverse them.

4.0 Discussion

The objective of this study was to observe how the 'Literate' based training would be useful to poor readers on a multi-cultural classroom. Being part of a pilot study, it was hoped that the new information would highlight ways of how to make the 'Literate' of more use to the pupils learning how to read. The pre-intervention skills the pupils had before playing the 'Literate' seemed to be very cardinal in the general performance on the 'Literate' because the more pre-intervention skills a child possessed the better they performed on the 'Literate' while those with poor pre-intervention skills in terms of phonemic awareness also had difficulties identifying the orthographic items on the 'Literate' accurately.

4.1 Benefits and setbacks of the 'Literate' game

To start with, the 'Literate' game was of great benefit to the pupils in that it was a motivating and fun way of improving reading skills. Lyytinen, Rominus, et al. (2005) actually states that the drilling practice provided by the game motivates towards faster performance in reading. The pupils also enjoyed the undivided attention they got as they played the 'Literate' and this made them very keen to play the game. The pupils usually showed high levels of enthusiasm and commitment and this was consistent with findings by Nicolson, Fawcett and Nicolson (2000). The 'Literate' game also enabled pupils to learn at their own pace as opposed to learning in the classroom and being dragged through the lesson by the teacher.

The hold-up experienced in the initial stages of playing was that most of the 'Literate' sounds were pronounced differently than is normally said, for example some words lacked appropriate stresses and there was a very slight difference between sounds like *B* and *P*, as well as *F* and *V*. This interfered with the pupils' capacity to work independently as the researcher had to come in every now and then, that is to say the sounds according to the way the pupils know and pronounce them. It is also worth noting that the sound quality on this 'Literate' game version was poor due to recording problems and so the output did not meet the usual 'Literate' criterion of having clear prototypic phoneme pronunciation.

While the ‘Literate’ game usually allows the player to proceed to new levels with 80% performance in this particular study the limit was 100%, which turned out to be a discouraging factor to the pupils.

It was also difficult to notice real gains as is reported in other studies in Finland mainly due to the limited time. The playing time of less than 2 hours on the ‘Literate’ was not long enough to get any clear results. Lyytinen, Rominus et al. (2005) clearly state that many at risk children require more time to steer them onto a track that helps them to reduce the unpleasant experiences of being slower learners than their classmates in the early classroom environment. In a nut shell, in this study there were problems to do with pronunciation, sound quality, high performance expectation (100%) and intervention time which altogether affected the general outcome. Nevertheless, the ‘Literate’ is a tool that can be used in literacy instruction to help poor readers in a multi-cultural setting.

4.2 Recommendations of the study

The problems of the pilot version of the English ‘Literate’ highlighted above should be considered when a new game version of the English ‘Literate’ is made for Zambia. This is to enhance meeting quality standards of other ‘Literate’ versions. In this regard, the manner in which the sounds and words are pronounced in the ‘Literate’ should be looked at in detail before commencing the intervention process. This is important as it will help the pupils ascend through the ‘Literate’ levels very fast from the onset.

The performance expectations of the ‘Literate’, whether for research purposes or not, should not always demand 100% performance from the pupils as this shows that the efforts the pupils are making to perform better (78% or 88%) are not appreciated. In this way not really pupil friendly!

The ‘Literate’ game should be introduced to both public and private schools seeing it is a high-quality game which would not only help poor readers acquire phonetic skills much easily but would also be useful to the pupils requiring lessons in English as a Second Language (ESL) in private schools / institutions.

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Appendix 1: Spelling Items

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

Appendix 2: Othorgraphic Fluency 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

Appendix 3: Deeper Assessment -Testing Package 1

Name:	Birthday:	Date of testing:
Home languages:	Gender:	Code:

1 Letter sound recognition

Say these aloud and let the child point the table. Mark down if the answer is wrong below the letters here:

A B C D E F G H I J K L M N O P Q R S T U Y W V Z

Score:

2 Letter sound production

Ask the child to say all the letters aloud from the table. Mark down if the answer is wrong:

A B C D E F G H I J K L M N O P Q R S T U Y W V Z

Score:

3 Letter spelling

Say the letters aloud and child writes them to the answer sheet

A B C D E F G H I J K L M N O P Q R S T U Y W V Z

Score:

4 Recognition of syllables

A table of syllables is showed to the child. Mark the answer to your own copy of the syllable tables.

1. ji	
2. la	
3. pe	
4. ki	
5. ba	
6. ze	
7. ru	
8. go	
9. fa	
10. du	

CV Score:

1. bat	
2. ted	
3. not	
4. sum	
5. bit	
6. ran	
7. pin	
8. zop	
9. den	
10. tug	

CVC Score:

SUM:

5 Spelling of syllables

Say these syllables aloud and the child writes them down.

1. ji	
2. bat	
3. la	
4. ted	
5. pe	
6. not	
7. ki	
8. sum	
9. ba	
10. bit	

Score

6. Oral reading short words

Give the child a list of words and mark down his/her performance, mark ok if child reads the word perfectly, if she/he does any mistakes write the word like the child said it.

1	It	
2	No	
3	Up	
4	end	
5	fig	
6	fat	
7	hot	
8	for	
9	too	
10	bed	
11	out	
12	she	
13	doll	
14	with	

15	want	
16	step	
17	milk	
18	bank	
19	ring	
20	help	
21	room	
22	when	
23	track	
24	river	
25	groom	
26	trend	
27	thank	
28	blast	
29	drink	
30	plump	

7 Spelling of short words

1. testing	2. testing	3. testing	4. testing	5. testing
Fat				
was				
She				
Fly				
End				
Took				
Small				
Chop				
brush				
Start				
Three				

Dictate the words above aloud for the child.

* for 2nd to 5th testing, jumble the list 1 set of words.

Appendix 4: Daisygraph Targets and their Distractors

Level 1

Target items	Distractors
F	(V, M, I)
M	(V, I, F)
V	(M, I, F)
I	(V, M, F)

Level 2

Target Items	Distractors
A	(N, B, P)
N	(A, B, P)
P	(N, A, B)
B	(N, A, P)

Level 3

Target Items	Distractors
O	(D, L, K)
L	(D, K, O)
K	(D, L, O)
D	(L, K, O)

Level 4

Target Items	Distractors
IF	(IN, ON, AM, AN)
AN	(ON, AM, IN, IF)

IN	(IF, AM, AN, ON)
AM	(ON, IN, AN, IF)
ON	(AM, AN, IN, IF)

Level 5

Target items	Distractors
DIM	(BIN, LID, LIP, NIP, BIB, DID, PIN, KID, DIP, PIP)
BIN	(LID, LIP, NIP, BIB, DID, PIN, KID, DIP, PIP, DIM)
LID	(LIP, NIP, BIN, PIN, BIB, DID, KID, DIP, PIP, DIM)
LIP	(LID, NIP, BIN, PIN, BIB, DID, KID, DIP, PIP, DIM)
NIP	(LIP, LID, BIN, PIN, BIB, DID, KID, DIP, PIP, DIM)
BIB	(LIP, DIP, PIP, LID, BIN, PIN, DID, KID, DIM, BIB)
DID	(DIP, DIM, PIP, PIN, NIP, LID, LIP, BIN, BIB, KID)
PIN	(NIP, PIP, BIN, BIB, KID, LID, LIP, DIM, DIP, DID)
KID	(DIP, DID, DIM, LID, LIP, BIB, BIN, PIP, PIN, NIP)
DIP	(DID, LID, LIP, DIM, BIN, BIB, PIN, PIP, NIP, KID)
PIP	(LIP, NIP, PIN, LID, DIM, DID, BIB, KID, BIN, DIP)

Level 6

Target items	Distractors
PAL	(DAD, BAD, PAD, MAD, PAN, VAN, MAN, FAN, LAP, NAP, MAP)
PAD	(PAL, BAD, DAD, MAD, PAN, VAN, MAN, FAN, LAP, NAP, MAP)
FAN	(PAL, DAD, BAD, PAD, MAD, PAN, VAN, MAN, LAP, NAP, MAP)
PAN	(PAL, DAD, BAD, PAD, MAD, VAN, MAN, FAN, LAP, NAP, MAP)
BAD	(PAL, DAD, PAD, MAD, PAN, VAN, MAN, FAN, LAP, NAP, MAP)
MAN	(PAL, DAD, BAD, PAD, MAD, PAN, VAN, FAN, LAP, NAP, MAP)
MAP	(PAL, DAD, BAD, PAD, MAD, PAN, VAN, MAN, FAN, LAP, NAP)
LAP	(PAL, BAD, DAD, PAD, MAD, PAN, VAN, MAN, FAN, NAP, MAP)
VAN	(PAL, DAD, BAD, PAD, MAD, PAN, MAN, FAN, LAP, NAP, MAP)

NAP	(PAL, BAD, DAD, PAD, MAD, PAN, VAN, MAN, FAN, LAP, MAP)
DAD	(PAL, BAD, PAD, MAD, PAN, VAN, MAN, FAN, LAP, NAP, MAP)
MAD	(PAL, DAD, BAD, PAD, PAN, VAN, MAN, FAN, LAP, NAP, MAP)

Level 7

Target Items	Distractors
MOP	(POP, POD, NOD, ND, AND, BAND, LAND, POND, BOND)
POP	(MOP, POD, NOD, ND, AND, BAND, LAND, POND, BOND)
POD	(MOP, POP, NOD, ND, AND, BAND, LAND, POND, BOND)
NOD	(MOP, POP, POD, ND, AND, BAND, LAND, POND, BOND)
ND	(MOP, POP, POD, NOD, AND, BAND, LAND, POND, BOND)
AND	(MOP, POP, POD, NOD, ND, BAND, LAND, POND, BOND)
BAND	(MOP, POP, POD, NOD, ND, AND, LAND, POND, BOND)
LAND	(MOP, POP, POD, NOD, ND, AND, BAND, POND, BOND)
POND	(MOP, POP, POD, NOD, ND, AND, LAND, BAND, BOND)
BOND	(MOP, POP, POD, NOD, ND, AND, BAND, LAND, POND)

Level 8

Target Items	Distractors
BLOND	(BLAND, PLOD, PLAN, BLOB, BLIP, BL, PL, POND, BAND, AND ND)
PL	(BLOND, BLAND, PLOD, PLAN, BLOP, BL, BOND, BAND, AND, ND)
BL	(BLOND, BLAND, PLOD, PLAN, BLOP, BLIP, PL, POND, BAND, AND, ND)
BLIP	(BLOND, BLAND, PLOD, PLAN, BLOP, PL, BL, POND, BAND, AND ND)
BLAND	(BLOND, PLOD, BLOB, BLIP, PL, BL, POND, LAND, BAND, AND, ND)
PLOD	(BLOND, BLAND, PLAN, BLOP, BLIP, PL, BL, POND, LAND, BAND, AND, ND)
PLAN	(BLOND, BLAND, PLOD, BLOB, BLIP, PL, BL, POND, BAND, ND)
BLOB	(BLOND, BLAND, PLOD, PLAN, BLIP, PL, BL, POND, BAND, AND, ND)