

## **Major Project – Final Report**

The design and trial of an interactive computer program *Lata-kuunu* to support Warlpiri school children's literacy learning.

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## **Abstract**

This project report explains how and why a researcher, who for 28 years worked as a teacher and teacher-linguist at the same Central Australian Aboriginal school, planned to design, construct and trial an interactive computer program for students in bilingual or two way learning classes. The development of the computer based program, known as “Lata kuunu”, was based on three principal premises: the importance of learning phonics, the importance of learning in the first language, and the potential usefulness of an interactive computer program to introduce and reinforce Warlpiri phonics.

Although at the time the report was prepared the software program had not been completed, the researcher-developer is confident that the whole package will be of value to teachers and education workers in making them aware of the immense time and cost involved. However, rather than putting off others considering embarking on interactive computer projects, this report assures them that any non-technical person can make such a program with some assistance.

This paper offers some insight into the challenge of Warlpiri education and of teaching literacy in particular. It examines the literature on literacy attainment, the role of phonics, the role and importance of the indigenous language as well as other computer projects in Aboriginal schools and in the wider world. It describes some strategies which have been successful with Yuendumu children. As such, this report contains material that may be relevant for all indigenous educators across Australia.

## Introduction

Many Warlpiri-speaking children in Warlpiri community schools fail to become independent readers and writers. At Yuendumu, a Warlpiri community of approximately 1000 people in Central Australia, about half the school students do develop literacy skills by the end of primary school or in post primary classes, but few do so at an early primary stage as do most mainstream children.

About half the Yuendumu school students drop out of school, or reach the end of their schooling, before becoming independent readers and writers. Because reading is such an essential part of learning, the education of the children who lack early reading skills is held back in all subject areas. Students are very teacher dependent until they learn to read and write independently. The basic aim of this project is to assist Warlpiri children to become independent readers at an earlier age. It aims to do so by producing an interactive computer program entitled *Lata-kuurnu* to introduce and reinforce basic literacy skills, in particular phonics.

Stanovich (2002) reports that studies conducted at the University of Toronto have shown that:

Children's facility with reading in the first grade usually provides a good indication of what their 11th grade reading proficiency will turn out to be. Why? Because reading requires practice and those who excel end up practising the most. Hence, the gap between the more and less able readers in the first few grades generally grows over the years.

In Australian mainstream schools children generally become independent readers of material at their grade level in Year 1 or 2. Warlpiri children, who do not achieve

independent reading till year 6 or later, are missing out on four or five years of early reading practice, and this gap can be expected to grow throughout their schooling.

The late development of reading skills in Warlpiri schools can be attributed to a variety of factors:

- Poor attendance<sup>1</sup>
- A lack of reading materials in the homes or around the community
- Illiterate parents
- A high turnover of teachers in the schools
- Inexperienced teachers and insufficient support structures for new teachers
- Poor or unsuitable teaching programs and materials
- Programs that are poorly staffed and/or poorly funded
- Bi-lingual programs that are inadequately supported by non-Warlpiri teaching staff and/or principals
- Poor communication between white teachers and Warlpiri teachers
- Social problems and poverty in the community
- Parent and student resistance to domination by a foreign culture. They see white people as the bogeyman, the enemy or a presence to be worked around.
- Student resistance to learning and communication styles of a foreign culture by not responding or engaging in learning interactions.
- Resistance to English letters which have no stand-alone meaning

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<sup>1</sup> Average attendance at Yuendumu school in 2002 has been 63% of enrolment. Poor attendance affects all students even those who do attend regularly because teachers have to spend so much time going over things that some of the children have missed. Also truant children can be very disruptive when they do turn up.



- Cultural values that discourage children working things out by themselves and learning more than adults in their families, and promote a fear of getting things wrong.

This list is not exhaustive.

English letters bear no resemblance to anything meaningful, unlike Warlpiri iconography where each symbol has a meaning and contains some feature of the thing it represents, e.g. animals are represented by stylized tracks.

Teachers are quick to attribute the failure of some regular attenders to master literacy to low IQ. It is difficult to identify clinically defined slow learners in a school where all students are struggling with a foreign language and culture and often with a hearing loss. In fact, IQ may have little to do with it. Rayner (2002) reports that "Studies in the 50's and 60's have shown that IQ has little bearing on early reading ability and children with reading difficulties often have above average IQ".

Despite the foreign language and culture, and despite hearing loss, there are Warlpiri students who do learn to read early, despite these obstacles. These children are always fairly regular attenders, yet other regular attenders continue to fail to master basic reading skills. Most good readers are children of literate parents but some are not. The handful of older literate people in Warlpiri communities certainly had illiterate parents.<sup>2</sup>

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<sup>2</sup> Yuendumu was started as a ration station in 1948. Lajamanu was later. Willowra was a cattle station with no school until the 50s. Nyirrpri was an outstation of Yuendumu and the people who live there now came mostly from Yuendumu and some from Papunya which started in 1968. Before these dates Warlpiri children had no schooling.

There have been times over the last 30 years when more Warlpiri students have developed independent reading skills in earlier years, some in Year 2, and most regular attenders by Year 3 or 4, but this has not occurred recently.

This project is based on reproducing some of the earlier practices in Yuendumu school which did produce early development of literacy skills. It includes an interactive computer program, entitled *Lata-kuunu*, for use by students from Year 1 onwards in the Warlpiri schools. This program *Lata-kuunu* will benefit Warlpiri schools' populations of approximately three hundred children

There are currently four Warlpiri bilingual (or 'two way') schools where literacy is introduced in the indigenous language. These schools are at Yuendumu, Willowra, Lajamanu and Nyirrpri in Central Australia. At these schools there are a number of trained Warlpiri teachers as well as Warlpiri assistant teachers who work alongside non-Warlpiri teachers.

## **Section A – Literature and Program Review**

### **1. Literature Review - Computers in Aboriginal Education**

Reports on the use of computers in Aboriginal schools are few. Though the schools have had computers for 10 to 20 years now, these are often not used to the best advantage for teaching. In a busy school there is often no teacher on staff with the time and expertise to maintain computers, fix problems or help other teachers. There are very few computer advisers in the NT Education department and sometimes only one. Bush schools are lucky if they get a visit once a year from a computer adviser.

The Department of Employment, Education and Training has recently put a large number of IBM type computers in Aboriginal schools but no advisers have come to show teachers how to use them. These problems are prevalent in mainstream schools too. As LeBlanc (1994) writes:

As students vie for snatches of time on the machines, their efforts are often plagued by faulty equipment, incompatible hardware and software, underlying institutional problems of tracking time structures and class size. Many teachers are so disillusioned that they have given up any real effort at curricular integration of the technology. ... For the most part teachers must train themselves and when they do they often become the support person for the whole school with a great deal more work than before but excluded from the decision making process. (LeBlanc, 1994)

In addition, teachers do not know what software to buy for schools. Programs purchased for Yuendumu school have often proved unsuitable, demanding a knowledge of the subject and a literacy level that the Warlpiri students do not have.

## **O'Donoghue 1991**

Brother R.R. O'Donoghue of Kununurra, W.A. wrote a useful article called *Why the Aboriginal Child succeeds at the computer*. He began with a young local teacher's explanation of why this was so.

1. Racial differences go out the window
2. Ability groups do not matter - all are happily involved
3. Concepts, e.g. directions, come early...
4. The use of the computer hastens sightword recognition [i.e. repetition]
5. Adult helpers [i.e. assistant teachers] are well employed (O'Donoghue, 1991)

Although the situation is different in Warlpiri schools there is some resonance in all these suggestions. Warlpiri children are rarely subjected to racism in a primarily Aboriginal community and in classes comprised totally of Warlpiri children. But individual children are often treated differently by Warlpiri teachers as a result of the social structure. If they are closely related to the teacher (from the same family group), they may have all their work done for them or get so much help they never have to think. If they are not related, they may get no help at all. This is socially less damaging than other kinds of discrimination as the children understand that this is simply a matter of relationships and not due to a personal dislike or fault in themselves. However, it is still a handicap to learning. Accordingly the first suggested reason for the advantages of computer learning could be re-phrased to read "Preferential treatment goes out the window."

The second suggestion I take to mean that, when computers are being used, children do not see themselves assigned to fast or slow groups. Teachers do not have the headache of needing to set up eight or more groups to cater for all the different literacy levels of

children in their class. For practical management purposes, students are more often assigned to two or three groups, and many students are presented with work not appropriate to their level or pace. Students can work through a computer program at their own pace.

The third suggestion, “Concepts, e.g. direction come early”, is accurate. Aboriginal children do learn to use the mouse and the keyboard, arrow buttons and selection conventions quite easily. They seem to be happier typing than writing and they respond more effectively to a visual medium as compared to a verbal one.

The fourth suggestion, “The computer hastens sightword recognition”, is also relevant. Any recognition task can be learned easily through an interactive computer program, which reinforces correct responses, allows infinite time and retries, and does not move on till children consistently give correct responses. A teacher with a class or group of children can never give each child exactly the right amount of practice because they all have different needs in this regard.

“Adult helpers are well employed.” This apparently refers to Aboriginal assistant teachers being under-utilised in the classroom. A Warlpiri interactive program with Warlpiri instructions would make it easy for a Warlpiri teacher or Assistant teacher to supervise and help children if they do not understand what they have to do. New or inexperienced staff could immediately become involved in literacy instruction. A simple written English instruction at the bottom of the screen can help non-Warlpiri teachers to show children what to do.

Brother O'Donoghue later gives some of his own reasons for Aboriginal children's success at computer learning:

1. Computers are friendly; they encourage rather than chide.
2. Computers offer colourful graphics and quick dynamic action. Aboriginal children have strong visual/ spatial memory skills.
3. There are many computer programs that do not depend on reading skills.
4. The absence of the spoken word removes one of the greatest difficulties - listening and understanding a white teacher.

The first three statements are apparent. Suggestion number 4 has less relevance in Warlpiri situations where much of the instruction in Warlpiri schools is given by Warlpiri teachers and Assistant teachers. Computers do talk. This program at least talks in Warlpiri.

In his summary O'Donoghue also mentions that "the computer is a patient medium and allows many mistakes and the freedom to try again". I find children much happier to have a go at writing on the computer because they know they can just press *delete* and any mistake is gone. Also, usually, no one is watching them to laugh or tease over mistakes.

O'Donoghue (1991) also mentions that "there are instant results and pleasure". In classes I find many children, especially boys, seem to get frustrated and lose interest because the teacher can not immediately respond to them individually. Often they will not proceed without approval of their previous response, a letter written or an answer given.

### **Devlin & Durling, (1995)**

Devlin & Durling (1995), in their *Study on the Use of Compact Disc technology in Remote Area Schools*, were unable to draw conclusions on the usefulness of the medium. This was due to many factors including: the small number of schools involved in the pilot study being examined; the small number of students at each site; low retention rate of students; the short time frame; little feed back from sites in terms of academic gains; and numerous problems in starting up; maintenance of software; supervision and so on. However, it is most useful for our project *Lata-kuunu* as it reports a lot of feedback from sites on problems in the structure and presentation of CD ROM-based programs as well as problems with implementation. It provides a useful lesson in problems to try and avoid.

In their study, (Devlin & Durling, 1995), the problems reported by teachers and reviewers to do with the software design included:

- Difficulty escaping the program. Users could not quit or remove the disc. The only way to quit was to pull out the plug.
- The teacher could not preview the lessons without going through the whole program.
- It was not possible to leave out anything the teacher knew to be inappropriate.
- There was a sense of being controlled by the program. There were no choices. There was no way to omit the "boring opening sequence". You could only do everything in the prescribed order.
- There was no index, no names of sections.
- Fundamental explanatory links were found to be missing.
- The program informed users only whether they were right or wrong, but there was no chance to pinpoint the errors or for users to find out why they were wrong. There

was no diagnostic function to identify patterns of error and refer the student back to relevant sections.

- The sequential nature of the program, where development of the next skill depended on mastery of the previous section, meant there was great potential for compounding error thus reinforcing students' perception of failure.
- There was no 'back' button. Users could not go back.
- Instructions were in writing and every word on screen was read aloud. A few students found this useful but good readers had read it all, long before the sound track finished and slow readers found it boring. There was no way to turn the sound off.
- There was no way to skip long segments of recorded sound.
- Users were constrained by the program to act passively for long stretches of time.
- Delays in movement were frustrating.
- The lessons were of different unpredictable lengths and generally too long.
- There was a limited use of music and video clips.
- There was a "clutter of icons" and no alert buttons to say "are you sure?"
- There was too much content introduced too quickly. Things that normally take a teacher a week to cover were given in one lesson.
- The CD-ROM sound track was not loud enough for use in a normal busy classroom.
- Teachers generally reported that the program was "pitched at a level which was too high for their students". The report commented "We were lead to wonder whether students selected to use the software were in fact ready to work with year 8 materials".



The CD-ROM program evaluated by Devlin & Durling (1995) seems to have been rather poorly designed or was in an early stage of development. It did however give a strong framework for problems to be avoided in our own program design.

In regard to the level for which the program was designed (Year 8) perhaps the designers of the program were not aware of the level of competency achieved by remote area schools in Year 8. I would suggest that a program for remote area students should be tailor-made for the students' abilities, rather than make a program regardless of whether there are any students that it is suitable for.

One of the problems at Yuendumu school is that children are going from grade 6 into a post primary class for which there is no Year 7 curriculum in the NT. There is no year 7 program in hard copy or on computer for remote students, even though in Yuendumu, and I suspect in many remote communities, the majority of secondary-age students attending school are in their seventh year of schooling. If they are literate and want to progress, they have to do the year 8 course which most of them, not surprisingly, find too difficult. They finish primary Year 6 at age 11 or 12 and the secondary boarding colleges in the Northern Territory, Yirara and Kormilda, quite rightly say they are too young to cope with the demands of boarding school. This highlights the importance of determining the ability level of the students that a computer program is being designed for.

Other practical issues raised in the Devlin & Durling report are as follows:

- The subject area experts were very critical of the program. The report recommends that the computer program development team and the subject area expert need to work together closely.

- Teachers need inservicing in how to use the program rather than just have it turn up in the mail. They had starting up problems. Some didn't read the "read me" file which contained instructions on starting up the program.
- Students were not told why they were learning these things. "The absence of rationale becomes more strikingly apparent on a stand alone package such as a CD."
- CDs scratch easily.
- One concern was that this particular CD format promotes guessing.
- Students constantly asking for help was a problem and a sign that there were insufficient help options built in to the program or that the students were not at the level of literacy and school achievement required for the program content.  
(Teachers need to be made aware of the level of supervision needed and be prepared to help students while doing the program. If a child can not do something and can not get help, at best it's a waste of their time; more often they find diversions. )
- Teachers need to know that computer learning has to be supported by classroom learning. If children don't have a prerequisite basic understanding, they need actual teaching, not just more practice.
- It was recommended that this CD for Year 8 Remote Area students should be part of a kit.

One quote from the Devlin & Durling report which raises a worrisome issue for our project is: "Print materials are judged against commercially produced materials. The benchmark for these programs (interactive programs) will be the multi-media games that students will be increasingly exposed to...there is a large gap to be closed".

Another serious problem raised in the Devlin & Durling report is that computer learning is seen by some administrators as a cheap alternative to providing teachers. This is a

misconception on the part of some administrators. Firstly, designing computer programs is not cheap. Secondly, no matter how good the computer program is, teaching is always necessary, to prepare the students for the program, to supervise them and answer questions while using it, to pick up on the areas where they need more teaching and to reinforce the learning in discussion or activities. Perhaps at upper secondary and tertiary, with very literate students, email discussion could take the place of class discussion. However, if there are any learning objectives even this will probably need some input from a teacher online to keep the discussion on track.

It is certainly not cheaper to make interactive computer programs. It is extremely time consuming. It takes expertise and that is very expensive (from \$120 an hour at entity 1 in Darwin to \$80 an hour at minkirri in Melbourne plus travel to and from these places if programs are to be made by school staff). Also expensive resources are required including modern powerful computers (a G4 Mac is \$6000). The software is also expensive, Macromedia Director is over \$2000, and Adobe Premiere is about the same. You also need a video camera, a scanner, a CD burner. You also have to have artists, music, voice recording, education and often language specialists and project advisor, and close access to the school and students the program is for.

A cost comparison can be made with another multimedia project similar in purpose and content to *Lata-kuunu* called *Kantaro* (Chow, 1990), designed to teach Western students of Japanese 700 Kanji (ideographic written symbols originating in China and used in modern Japanese). This project received two grants from the Australian CAUT

(Committee for the Advancement of University Teaching): \$48,650 in 1994 and \$49,950 in 1995.<sup>3</sup>

The *Kantaro* team were also very fortunate in getting help from Fujitsu (an international I.T. communications and micro-electronics company), which provided personnel and resources to develop the project, producing three CDs containing games, animations and exercises. Chow reports, “had they not had the support from Fujitsu the CAUT funding would have allowed the production of a few chapters, nothing more”. The project took four years to complete. There was some funding for team members but funds did not cover them all. A few team members received teaching release, two to four hours a week. All team members spent evenings and weekends working on the project and also donated time to undertake evaluations of the software.

Almost the entire staff of Japanese Studies at Macquarie University was involved in the development of this project which is now used in a number of universities, high schools and TAFE institutions in Australia, New Zealand and Japan and is sold for \$149 per set. Fujitsu owns the copyright on the technical side of the program. Macquarie Research Ltd owns copyright on the intellectual property and receives a small amount in royalties.

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<sup>3</sup>The mean size of CAUT grants for IT projects was \$43,789 and ranged from \$14,997 to \$100,000. Some projects were given supplementary funding by the Universities. Many project reports mentioned underfunding as one of their problems. One comment from a report stated, “A commercial project like this would have a big team and cost \$0.5 million” .

## **Derich (1991)**

Derich (1991) describes an early successful computer-based program teaching Wangkatja, a Western Desert Language. The program used touch-sensitive boards. As pictures were touched, letters, words or sentences (depending on the exercise) appeared on the screen. Children could make sentences before fully mastering the spelling system. Children's work was made into individual or class readers. Two of Derich's conclusions were:

- Use of computer strategies has had a marked impact on students' literacy skills, particularly in the younger children, diluted somewhat by the lack of an explicit plan for the promotion of the use of Wangkatja in school.
- Long-term perspectives need to be taken in any future program so that the strategies can be articulated and carried on through staff changes which will inevitably occur at such a remote school (Derich, 1991).

Aboriginal Language programs, like computer education programs, are also dependent on the lucky dip of school staffing for their initiation, success and continuation.

## **2. Literature Review – Cross Cultural computer educational programs**

### **Kantaro**

Perhaps the most relevant report on cross cultural learning through interactive computer programs is the one on the *Kantaro* program (Chow, 1990) mentioned above in regard to costing. It is relevant because it is a type of literacy program, but more importantly, it was designed to help students of one culture overcome problems with learning the literacy characters and conventions of another [culture].

The Chow report states:

Non-Kanji background learners face a significant challenge in moving from a sound based language system based on the alphabet, to the meaning based system of Kanji. (Chow, 1990)

The lecturers were concerned that Western students experienced so much difficulty with Kanji that they required much repetitive tutoring and a number withdrew before completing the program. They felt students were graduating from the program while only partially literate in the language.

The same concerns apply to Warlpiri students learning English literacy at primary, secondary and tertiary levels. The *Kantaro* program “helps students learn each character, its form, meaning and the way it is formed”. It leads up to a grammar program and story telling module.

Students work with games, small exercises in small groups in the computer lab in a co-operative atmosphere and when they become more practiced they can work together to combine Kanji to make new meanings. ...A built-in trace tracks time taken and results of tests, a record is kept for each student ...The course uses extensive mnemonics and multimedia elements such as dynamic animated graphics created through morphing software and sound modules. (Chow, 1990)

When the program was trialled, 120 students trialled Volume 1 (first CD ) over a period of 13 weeks and 82 students trialled Volume 2 (second CD). The results included:

- An increase in the Kanji characters acquired from 115 to 200.
- 51% students recording over 90% retention of 200 Kanji characters compared to 47% of 115 characters for the previous year.

- Decreased learning time
- Increased spare time allowing extra face-to-face teaching with students needing extra help.
- Improved motivation and interest in learning Japanese.

The report says:

The outcome that was not expected is the change in students' attitude toward learning the rest of the Japanese program. ...The atmosphere in the class has changed as students are no longer afraid of learning Kanji and this positive attitude has spread to other parts of the subject. (Chow, 1990)

These results are very encouraging for the *Lata-kuunu* project in that if Warlpiri students could just get over the tedious but necessary phonics component of literacy (without years of going over the same ground yet still being unable to remember all the characters or use them in reading and writing), then they would have a more positive attitude to literacy. Once children do master the letters to the point where they can decode and encode, they progress very well.

### **Computer Use in an Indian Reservation School**

Hickenbottom & Schamber (2002) describe a successful internet-based project with Native American students. The children worked with parents to write and illustrate traditional stories and knowledge, which they published on the internet. Children used the internet to find or check geographical and historical knowledge. Hickenbottom & Schamber write, " through technology, every child, regardless of cultural background has equal access to the vast learning resources that were once available to only a privileged few."

Graeme Sawyer, programmer at entity 1, Darwin, told me he was involved in a similar project in Arnhemland communities. He says it was a great way of involving adults in the school, that there was much enthusiasm for the project and students were more highly motivated to engage in literacy activities. They became proficient in using the computers and software. I see this type of education as having the potential to satisfy both the communities' agenda of cultural maintenance, and the government agenda of developing literacy and skills in mainstream communication. It does however require computer expertise which is scarce in remote communities.

Native American schools get extra funding just as Aboriginal schools have been suddenly given computers through the LATIS program. If there happens to be a person in the Education Department or on the school staff who is familiar with computers in education, computers and software are ordered and if there is still someone keen on staff for a significant time after their arrival, computer education flourishes. Very often there is no one able and willing to make computer education work well.

### **Hole in the Wall**

A project which shows how well children learn to use computers is "Hole in the Wall", described by Searles (2002) in which Dr S. Mitre put internet kiosks where kids can hang out in the poorest parts of New Delhi. The objective was, "to see if people would be interested in using an unmanned internet based kiosk, out in the open without any instructions, and to ascertain if it could be operational without supervision".

The first kiosk was put in the outer wall of Dr Mitre's office, adjacent to a slum area where there were many children who did not go to school and the few who did go, went



to government schools lacking in teachers and resources. The children were "not particularly familiar with English". The results were remarkable. After three months the local children could browse the internet, download songs, go to cartoon sites and use a paint program. After four months they could create folders, resize the screen, and cut and paste to make short messages as there was no keyboard.

Approximately 80 children per day used the site. They invented their own computer terms, e.g. *sui* - needle for the cursor, *damru* - drum for the wait hourglass. There are now 29 different Holes in the Wall in four Indian cities.

Here are some of the findings:

- Adults do not participate but are supportive of the children using the kiosks. Children range in age from about 6 to 18 years.
- Children share what they learn,
- Children are not left out. Girls take an organising role. In some places they have organised classes to teach each other,
- Users do not damage the equipment
- Users work out improvements, e.g. the sound enhancement of music files

Dr Mitre was very pleased when one group of children sent him a message in Hindi which said "We have found the thing you watch us with and closed it".

The big difference between these Indian children and Warlpiri children is that Indian children belong to a literate society, many speaking and writing several languages, some with different scripts. Literacy is often taught at home, even when children do go to school, because the home language is often not the same as the school language.

### 3. Literature Review – Electronic teaching and learning

There is a body of literature on 3D learning, that is, learning through audio-visual-interactive programs on the internet or using stand-alone programs which I have reviewed for this project. Although there are multitudinous studies, few provide actual statistical results and analysis on the effectiveness of this type of learning.

McClung (2001) writes, "The popularity of the internet has resulted in a technological revolution in education. Lectures, research, courses and entire college degrees are delivered on the web".

One website, where research has been done on what is available in web based distance learning, boasts a database of "150,000 on-line courses from kindergarten to doctoral programs". This struck me as somewhat of an over provision.

Because of the limited relevance of these studies to the *Latu-kuunu* program the general Literature Review of electronic learning is now attached as **Appendix One**. Literature relating to the use of computer programs to teaching phonics is reviewed below.

### 4. Review of computer programs for teaching phonics

#### Phonics Alive

*Phonics Alive* was initiated by the NSW Dept of Education and programmed by mightymedia.com.au and made in Sydney. This program has been useful for some children in Yuendumu school. *Phonics Alive* is not designed for ESL students and does not deal with their particular difficulties in distinguishing English sounds. However

children enjoy using the computer and look forward to their *Phonics Alive* sessions. They enjoy the simple animations which serve as rewards for correct responses. Some teachers have found this program useful with older remedial students. These teachers tell me that *Phonics Alive 2*, which introduces blends and diagraphs, is not as useful as the original *Phonics Alive* program

I sat with some children of various ages while they used *Phonics Alive* and observed their progress. The program worked best with 9 and 10 year olds who already knew most of the letters and had an understanding of how letters are used to make words. It was good reinforcement for them and helped when they were unsure of just some of the letters.

Younger children from 6 to 8 years enjoyed the program, laughing loudly at the animations. However they were unable to learn any letters from the program. They could do matching exercises such as finding letters on the keyboard, but did not remember them. They could only guess at picking the picture for a word starting with a given sound. They clicked the pictures in turn or randomly. They learned the right pictures after one session. They could nearly always click the right picture on the second session, even when they had no idea what some of the words were. Some children actually said aloud a Warlpiri word or a different English word, which of course did not start with the given letter at all. They were unable to find a letter among others, given only the spoken sound, and quickly lost interest in this, although the letters moved around in various interesting ways.

The most useful exercises in *Phonics Alive* required listening for the same sound, e.g. *balloon starts with "b", Point to the picture whose name starts with "b"*. Some

children with little knowledge of phonics learned to do this successfully, provided they knew the words.

Children with no previous letter recognition skills did not learn to select the right letter for a sound using *Phonics Alive* alone. Too many letters are introduced at once, children get rewards from repeated guessing, and the program moves on before they have learned the letters.

### **Jump Start Reading and Reading and Phonics**

I have watched children use a number of commercially produced educational programs such as *Jump Start Reading* and *Reading and Phonics* which says on the cover "based on Australian and New Zealand Curricula". These programs are bought by parents through school book-clubs. The graphics are excellent but the content appears to be designed by computer programmers and not by teachers.

*Reading and Phonics* lets children choose games ranging from a preschool type matching pictures game, to a variety of games assuming children can read words. There are no intermediate steps, for example no matching of letters or words. Children can eventually get right answers by repeated guessing or systematically working through all the options given, but it has nothing to do with reading or phonics in particular.

*Jump Start Reading* has one useful game where children have to pick bowling balls with the right letters to make given simple words, which is useful for children who know the letters and have an understanding of blending. There is no exercise where children have to read simple words. There is an exercise where children have to pick the

right word, (from a set of quite difficult words) to put in sentences, and this is useful for children who already read.

I wondered why my 5-year-old grandson persisted so long in the rather repetitious task of trying every option since he had no word attack skills at all. He came running to tell us very joyfully when he "won". The visual and sound rewards, big scores and putting the child's name in the list of high scorers are such exciting results for children that the game is worthwhile for them, even when it is actually meaningless and educationally worthless. Usually when an activity is unsuitable for a child this soon becomes obvious to parents and the child ceases the activity.

### **Reading Freedom 1**

Even worse than these examples is a CD that NT University library sent me, the only phonics CD they had, called *Reading Freedom 1*. It is excruciatingly boring with long explanations, little interaction, boring stationary pictures, and no links to meaning.

Letters are "taught" by going through the whole alphabet saying *a – apple* etc.

Sightwords are taught by showing a screen full of random words you can click on to hear them said, with no context and no picture. The first word in the decoding section is "strand". It seems an absurdly complex decoding task to start with and I wonder how many children know what it means. There was no explanation of its meaning and no context. This is a program that will put off anyone thinking of using a computer program to help teach phonics.

## Section B – Why Phonics?

### 5. Current literacy teaching

It is obvious to myself and to others who have worked in Yuendumu school for many years (especially teacher-linguists Tameeka Thommers and Michael Harries) that the area of greatest weakness in the current literacy program is the teaching of phonics.

Many children are not mastering the phonic component of literacy in Warlpiri or English. Most children who attend fairly regularly, at least 70 percent of the time, have a good grasp of other aspects of reading. They understand the conventions of print, such as word spacing, left-to-right and top-to-bottom orientation. They can predict using meaning and syntax clues and they may build up an extensive sight vocabulary. However, they are dependent on help with unfamiliar words. Only children who do master phonic skills, progress well and become independent readers in Warlpiri and English.

For about the last 10 to 20 years the role of phonic skills in literacy attainment has been marginalised, not just in Yuendumu or Australia but throughout the English speaking world. A May 2003 report in Britain stated that "failure to teach phonics is the greatest weakness in U.K. schools."<sup>4</sup>

A report by the British standards watchdog Ofsted reported that one third of seven-year-olds failed to reach the expected reading standard and two fifths were below in writing.

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<sup>4</sup> U.K.news.bbc.co.uk May, 2003

Where schools were teaching phonics properly, children made good progress in reading and writing independently.<sup>5</sup>

Responding to this report the British Schools Minister, Catherine Ashton, said that "last year 38,000 teachers received training in the teaching of phonics and that the new phonics course, identified as the biggest need in education, would be in most of England's Primary Schools by next summer".<sup>6</sup>

The Teaching Handwriting, Reading and Spelling Skills (THRASS) program developed by the Department of Education and Skills, British Government, London is also being introduced in Australia. Although not an official part of the curriculum it is being introduced in Yuendumu school this year (2003) by the principal and teachers. This THRASS program uses natural synthesis (using letters to blend and build words) as opposed to analytic phonics (breaking given words into their letters). Analytic phonic programs have been the recent recommended practice. This practice sprang from the theory that literacy must start with meaningful text, (therefore a word rather than a letter), which is a logical application for teaching reading, but not so for writing.

Reports from Scotland [[www.scotland.gov.uk Library](http://www.scotland.gov.uk/Library) 5, May 2003] and New Zealand, (*The Reading Recovery* program by Marie Clay) show that children, especially boys, make significant progress using synthetic phonics programs. After similar findings in U.S.A. President Bush announced that the teaching of phonics would be a priority in Primary schools (Rayner, 2002).

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<sup>5</sup> ibid

<sup>6</sup> ibid

At Yuendumu over the years there have been some classes where more children than usual have mastered phonics and become good readers. This has been due to a remarkable teacher or a skilled mentor working with Aboriginal teachers. We know some of the strategies which have worked well (these are described in detail in this paper), but it is hard to get other teachers to use these strategies consistently and to do the required work with individual children. This is partly because less confident teachers are less able to keep the rest of the class busy and quiet while they work intensively with one child. It is also because traditional Warlpiri culture de-emphasizes the individual and encourages group membership. Warlpiri teachers tend to treat the class as one. They are reluctant to see or cater for individual differences.

## **6. Current relevant theory**

In his overview of research on reading acquisition Stanovich (1986) concludes:

If there is one identifiable cause of reading failure then it is failure of the individual to acquire proficiency with the structured nature of spoken language - its components and their combinations - and thus with the alphabetic script, and that, given the ways in which early schooling is organized, this failure can quickly lead to a cascade of avoidance strategies and other motivational problems beyond the first year or two of schooling.

Freebody and Luke (1990), suggest four roles of the reader: (1) code breaker, (2) text participant, (3) text user and (4) text analyst. According to them "code breaking or phonics is a necessary but not sufficient condition for reading". They say that the



reading profession is divided on two key issues - the sequencing of instruction in these four roles and the necessary degree of explication of these four roles.

Theories of reading that attempt to explain the process of reading are important because they have had quite a direct impact on the education department curriculum for language and literacy, inservicing of teachers and the content of teacher training programs.

Up till the 1950s phonics was the only aspect of reading which was explicitly taught. The rest of the skills required for reading competency were picked up informally through listening, reading along, and practice in reading and writing and comprehension exercises.

In the 1960s and 1970s cognitive psychology dominated learning theories. Goodman (1976) proposed that, "a proficient reader does not use all the signals built into the writing system...by exploiting the redundancies created by the interaction of meaning with syntax, fewer cues are required from print". The phonics approach was replaced with a whole word approach. The phonics approach to literacy was described as a bottom-up approach as it involves starting with the smallest parts of text building up to a meaningful picture. A top-down approach, starting with the whole text, was recognized as essential.

Then followed the interactive approach "three parts top down and one part "bottom up" (Sloan & Whitehead, 1986). The bottom-up method described by Sloan & Whitehead is an analytic phonics approach.

Along with the idea that reading must begin with meaningful parts (the smallest being whole words) came strategies for teaching writing using whole words. This allowed early creative but not independent writing, with children relying on sentence building cards (e.g. Breakthrough to Literacy sentence makers<sup>7</sup>), personal dictionaries or teacher help in the form of whole words to copy. Negotiated text activities allow children to generate the language but the writing is mostly done by the teacher.

In the 1980s reading theorists studied successful early readers and concluded that these children did not just soak up literacy through immersion, but that caregivers had done a great deal of teaching. Reading was seen as a social activity requiring interaction between learner and adult with parallels in infants learning to talk. Holdaway (1987) recommended a shared book approach which was thought to provide a way for teachers to simulate the interaction between parent and child while involving a large number of children as all could see the same text and illustrations. "Lap reading", that is, reading to one or two children, was recommended in Early Childhood classes.<sup>8</sup>

All these strategies, which are focussed on deriving meaning from text, are useful and have no doubt contributed to children's interpretative skills.

In *Learning to read in a multi-cultural society* Wallace, with many examples of miscue analysis of students reading, shows that migrant reading problems are almost all to do

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<sup>7</sup> The Breakthrough to Literacy materials, (Mackey, Thompson & Schaub, 1970) also included word maker folders but they were rarely if ever used in Yuendumu school. The letters were small and fiddly and so many children did not know the sounds well enough and could not make words.

<sup>8</sup> The idea of "lap reading" was to emulate the warm, personal, child centred interaction with books that children in literate families enjoy when sitting on the family members lap. This is the ideal early experience with text.

with loss of meaning, not poor phonic skills and in fact migrant children's reading problems stem from an over dependence on phonics. Although, like Warlpiri children, migrant children are struggling with a foreign language and culture, it should be remembered that migrant children usually come from literate societies and many have developed reading skills in their own languages.

As the gap between mainstream and Aboriginal educational outcomes widens there is an increasing mismatch in current recommended approaches to teaching literacy and the needs of Aboriginal students. In the mainstream there is little concern over students' acquisition of phonics skills (except in remedial cases) so policy has been directed towards other aspects of reading. Before they come to school most mainstream children have a good understanding of letters and how they work. The phonics instruction provided in most primary schools is probably adequate for most children from literate families.

## **7. Implementation of reading strategies in Yuendumu school**

Over the last 30 years there have been a number of fashions in the teaching of literacy at Yuendumu school. In the early 1970s we used an English literacy program of whole word recognition, phonics and comprehension, based on the Endeavor reading series.

In 1974 initial literacy in Warlpiri was introduced using an entirely phonics-based Warlpiri literacy program based on Sarah Gudschinsky's *A Manual of Literacy for Pre-literate Peoples*. Gudschinsky (1973) had put forward some principles which are basic to literacy teaching and had a great influence on teacher attitudes in the 1970s, for example, "A person can only learn to read in a language he understands" and "The principle of what reading is, is only learned once" (Gudschinsky, 1973).

The Gudschinsky method was quite successful in the early years of bilingual education. We had so very little reading material that children read their own stories and class stories many times over. Such child-and-teacher produced personal texts are very familiar, relevant and meaningful to the children. They naturally evoke a lot of interaction between children and the teacher and more closely simulate parent/child interactions than activities with published books. When combined with phonics drills, sounding out and spelling, this method produced a number of children who could read independently, if haltingly, by the end of grade 2, becoming increasingly fluent year by year.

In the late 1970s and 1980s we had a period when phonics was not to be taught explicitly at all. The theory was that children would simply soak up literacy by being "immersed in print". This was to be achieved by much shared book experience and story reading. Children learned a big (teacher-held) book off by heart and then could "read" an identical small book. Some teachers called this the mystical approach to reading. It was very teacher controlled. The teacher pointed to the words as they were read but children were often focused on the illustrations. Children did not touch the book until they knew it off by heart. Many children could not point to words correctly while "reading" and could not tell you what any given word was.

Learning a book off by heart is not a bad thing to do. Many children in literate homes do this. It may be an essential step in learning to read. But using this as the only reading activity in school is not helpful.

The next development in Yuendumu school was that phonics could be taught but only informally in the context of reading and writing, mainly during group reading of big books and writing negotiated text.<sup>9</sup> Some teachers continue this practice today. I believe an innovative and very consistent teacher focussed on individual achievement can teach phonics this way. However, at Yuendumu school the informal teaching of phonics in context tends to become centred on single letters, when it happens at all. Even when there is consistent teaching of some letters, they are random letters, chosen because they occur frequently in a selected big book. These letters, in the short term, can not be used to build any words and the teaching of phonics only in context approach does not advocate word building anyway.

In this method there is often no follow-up of letters learnt in one big book when the class begins the next big book and a different letter. Children may remember letters but have little idea how they work to make words or help you read words. Negotiated text is written by the teacher, or occasionally by a child who does have encoding skills.<sup>10</sup> The process is a mystery to most children who can only write by copying words or being told or shown every letter.

When, sometime later, it became apparent that many children actually did not know any letters or have any word attack skills, Warlpiri phonics was reintroduced as a separate

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<sup>9</sup> *Review of Activities and Approaches for Developing Literacy Programs in Aboriginal Schools*

NT Department of Education June 1985. This recommends that phonics be taught, "in the contexts of meaningful stories when children have shown they are ready to acquire this knowledge."

<sup>10</sup> Negotiated Stories, Traegar Park Language Project, N.T. Department of Education 1985 suggests, "The teacher can act as a scribe for the rough draft." See also *Concentrated Language Encounters in Aboriginal Schools in the N.T.* N.T. Department of Education 1985

activity, alongside the informal teaching of phonics during group reading of big books and group writing.

At some time in the early 1990s education experts focussed on the lack of understanding of social context as the main obstacle to reading progress. Aboriginal students' poor comprehension of English was explained in terms of their exclusion from "secret English", this being the language of reports, discussions, descriptions and other special purpose texts. The Northern Territory Education Department then wrote a new English curriculum, designing it around explicit teaching of genres or text for different purposes.

The genres have been treated as mutually exclusive and writing exercises are tailored to fit one specific genre. The Warlpiri literacy program was also modified to include genre teaching even though a number of the defined genres rarely, if ever, occur naturally in Warlpiri. A substantial amount of language engineering has to go into producing these

kinds of texts in Warlpiri. These texts lack the interest value of stories and most children can not read them anyway. They are usually read only once after production (as charts or class-made books) and sometimes not at all due to the degree of difficulty, and low interest value. For example, rather than reading a narrative story, children were expected to learn to read a recipe or a factual description.

Certainly, limited knowledge of context is a major problem for Warlpiri students learning to read English. There is no intrinsic reward in "reading" texts or even decoding words which have no meaning to the reader. They are unable to interact with the text, to bring their own knowledge to the task of making meaning. They may be

unaware that this is required of them as readers, if their experience of text has always been text in a poorly understood language.

Warlpiri students have even greater problems with English phonics than Warlpiri phonics, as most can not discriminate between a number of English sounds and they are unable to pronounce many English sounds in Standard English. “Mother has a fish”, becomes “Mother has a piss”. This makes it doubly difficult to work out how to "read" or write a word. These problems need to be addressed in Oral English lessons so that children are not struggling with pronunciation and sound discrimination at the same time as learning English letters and reading and writing.

However these problems with literacy should not arise when children are learning to read in their own language, which they can hear, understand and pronounce perfectly well. Although Warlpiri children have not been read to by adults during their childhood, most have been told stories in an interactive way. In these stories they are reminded of trips to places and the significance of characters, landforms and events. The link between story and reality is made very clear. Warlpiri children are not "culturally deprived". They have a culture rich in meanings and abstractions of its own kind.

At Yuendumu school children are read Warlpiri stories. The context of Warlpiri books is arguably more familiar to Warlpiri children than English books are to English-speaking children. Warlpiri children usually know the writer and illustrator, the setting is always familiar, the actual story is often known or the storyline blueprint is well known. There is nothing unexpected in the behaviour of characters. For example there are a number of Warlpiri stories about local monsters which eat people and later come to a bad end – and this is a common theme in Warlpiri culture.

Children who attend school reasonably regularly have a good understanding of how text works, what books are for and are able to bring their own knowledge to the task of comprehension and making meaningful predictions. Many are so good at guessing that it is rarely obvious that they "read" using sight words only, they make predictions using illustrations, meaning and syntax and disregard the letters entirely, not even using the first letter as a clue. There are some children who know all the letters and perform quite well in spelling exercises, but are not using this phonic knowledge to work out or predict words in text or to write their own stories.

## **8. The role of phonics in fluent reading**

Sloan & Whitehead (1986) write:

Recent criticism of the Smith & Goodman models (of reading cognition) centres on the fact that data from experiments does not support the prediction redundancy hypothesis. In particular, the claim that skilled readers do not thoroughly process the letter information in recognizing words, is contrary to research which indicates that skilled readers process words down to their individual letters. It seems that skilled readers, although aware of the redundancies which exist in language, do not use them to avoid processing data but rather to facilitate - or make automatic - the processing of that visual data.



Stanovich (2002) says: "most [psychologists] believe that reading is typically a process of rapidly sounding out words mentally, even for the highly skilled." Guy Van Orden of Arizona State University, in an experiment using homophones (e.g. rows - rose), found that subjects often mistakenly identified homophones as fitting a given category, (e.g. they responded to "rows" as flower category) showing that "readers convert strings of letters to sound (or rather, their unvoiced mental equivalents), which they then use to ascertain meanings." (Stanovich, 2002)

Eye movement studies have demonstrated that the process of sounding out words mentally begins very rapidly after a reader's gaze fixes on a particular word." Wallace (1998) says, "Vocalising is a necessary stage in the learning to read process". She points out that it is the only way learning readers can get feedback from a competent reader.

Rayner (2001) cites a report by Chall, J & Adams, M (Harvard University) who conducted classroom studies comparing phonics with either whole word or whole language instruction. Their reviews show "that systematic phonics instruction produces higher achievement for beginning readers. The differences are greatest for students at risk of failing to learn to read, such as those living in homes where the value of literacy is not emphasized."

I have noticed that many Warlpiri children, when they do learn to read using phonics skills, seem to forget all the sight words they knew before and so they sound out every word. When I say "you know that word" and remind them when they learnt it, they do remember, but even after saying it, some will still insist on sounding out the word. It could be suggested that learning sightwords was a waste of time. However, I think it is still useful because if a child knows a sightword, especially if they have had to write it,

it is a prop for learning the first letter. Many remember a letter by visualizing a word they know.

Rayner (2002) writes, "Recent brain studies show that the primary motor cortex is active during reading, presumably because it is involved with mouth movements used in reading aloud." A program on ABC TV in 2001 called "The Brain" had one episode on reading. In it a machine photographed the brain while reading and highlighted the areas of brain activity. They showed a 12-year-old boy's brain before he learnt to decode words and after intensive phonics instruction. When this boy saw the new area of his brain lighting up as he used his new phonics skills he said, "Cool!"

Freebody and Luke's (1990) statement that "Code breaking is a necessary but not sufficient condition for reading" could be stated the other way round—Interpreting meaning is a necessary but not sufficient condition for reading.

## **9. The need for literacy**

Even though the boy who featured in "The Brain" TV program, a mainstream student, is 6 or 7 years behind his peers in reading practice, he can probably catch up because he will presumably have plenty of reading opportunities and further opportunities for education after high school. He will probably become a lifetime reader. In Aboriginal communities, schools provide only six years of primary education and only in a few larger communities, a few extra years of post primary. There are no community libraries, usually no books or magazines for sale and few opportunities for reading or further education. Few students go away to secondary boarding schools and fewer to tertiary training institutions.

Most Aboriginal students in remote communities who finally pick up reading by the age of 12 years will have at most, two or three years of reading practice at school, if they live in a larger community. In smaller communities, which are the norm, if children do not learn to read independently in primary school, there will probably be no further opportunities.

When I was writing an essay on Community Development in 2001, I interviewed managers and workers of all organizations at Yuendumu. One question I asked was, "What do you think the school should be teaching to prepare students for Community self management?" Most wanted the school to teach both Warlpiri and English. A number of both Warlpiri and White respondents said the school should teach people to read and write properly. I think Beth Graham's summing up of Aboriginal educational aspirations is the best reflection of views I have heard repeatedly expressed at meetings in Warlpiri schools and communities, "Aboriginal parents want their children to learn the three R's and to grow up Aboriginal".

Senior teachers and teacher linguists who have tested Warlpiri children and monitored their progress inevitably come to the conclusion that failure to master phonics skills, decoding and encoding is the greatest obstacle to Warlpiri children's progress in literacy.

## **10. Barriers to mastering phonics**

There are a number of possible reasons for children's failure to develop phonics skills in Warlpiri schools. I have summarised these as follows:

- Phonics has either not been taught or taught poorly
- Children are not generalizing knowledge
- Children do not have to work out words by themselves
- Children over-rely on their well developed visual memory
- Children have less well developed auditory memory
- There is confusion between the two phonetic systems English and Warlpiri
- Decoding is unrewarding
- Children are so focussed on meaning that they disregard the letters
- Warlpiri cultural values discourage children from working things out themselves
- Warlpiri practices in teaching infants to talk

To explain these points in more detail:

Phonics has either not been taught, taught very inconsistently, or taught out of context and is rarely if ever seen to be used by teachers or others when reading.

Children are not generalizing knowledge learnt in one context to any other context.

They only know a word or letter in the one big book or flash card or phonics card where they learnt it and do not recognize it in another book unless it is pointed out. Words written in word building exercises may not be recognized in text and “forgotten” when a child needs to write them in a story.

Children do not have to work out words by themselves. They are always told the word by the teacher or another student. They have learnt to wait to be told. They wait to be told as is expected by Warlpiri superiors.

Decoding is slow at first. Whole word recognition is quick and Warlpiri children tend to have very good visual memory skills.

Many children have hearing problems and have not developed a good auditory memory. By the time they reach the last syllable they have forgotten the first one. Warlpiri words are mostly longer than English words.

Most children have not mastered the Warlpiri phonic system before learning English sounds and letters and some letters represent different sounds in each language.

The children have little success in decoding when they have not learnt the phonic system properly, so find it unrewarding.

Some children are so focussed on meaning that they ascribe meanings to single letters or syllables and are unable to separate sounds from words. They attempt to read a meaningful word given one letter or syllable. Many disregard even the first letter of an unfamiliar word in text and make guesses based on meaning alone.

Warlpiri cultural values discourage children from finding out or knowing things themselves. They are supposed to wait for a person of higher status to tell them. Warlpiri culture teaches a horror of getting things wrong, for fear of being teased and also for superstitious reasons.

Aboriginal parents and relations use different strategies in teaching children to talk than do English speakers. In her study of children in the goldfields region of W.A. Jacobs (1994) describes many of these differences in Aboriginal children's language development. Children are raised communally and do not need to master detailed communicative language till they join the children's peer group, where they then spend

most of their time and do much of their learning from older children. She studied children from birth to beginning school age and reports "Verbal delineation of required behaviours was never observed/... /there were no imaginative, heuristic or informative interactions recorded at all/ ... /The use of direct questions was not observed in use until nearly 5 years of age" (Jacobs, 1994). On the whole Aboriginal parents do not use explanation or teach children to ask questions; rather, they encourage children to learn by watching. Children are therefore not at all prepared for school communication styles and particularly interactions associated with teaching reading.

I have also noticed that Warlpiri grandmothers and older relatives who are often the prime carers throughout the day, as they are always home, like to teach 2- and 3-year-olds whole sentences or slabs of language through constant repetition. They are very pleased when a little girl "talks like a big woman" when in fact the child is unable to generate any sentence by herself.

Warlpiri children are taught to repeat names of people and objects but not encouraged to produce them in sentences. Also, when children mispronounce there is rarely any attempt to correct or provide a correct model. The few times I have heard correction, the carers repeat the whole word and sometimes the whole sentence. If children continue to mispronounce they give a synonym which may be easier to say. They never isolate a sound to practice as Anglo carers often do (e.g. "Not tat, cat, c - cat"). Thus they miss out on an obvious preparation for phonics learning.

However, in spite of all these obstacles, some Warlpiri children do learn to work out words and read independently. In every class there has always been a huge range of literacy ability; the gap increases year by year as the children progress through the

grades. There are usually one or two very good readers who mastered basic reading skills in Year 2. There are many who still have no basic literacy skills by the time they finish school. There are others who begin to read later in primary or post primary Years.

### **11. Previous successful strategies at Yuendumu**

In earlier years of bilingual education at Yuendumu, when Warlpiri Assistant teachers were delivering most of the face-to-face teaching (working closely with trained teachers as team), there was usually a group of about five out of 20 students who mastered phonic skills. These few could read simple unseen script by the end of year 2. If there was another good teaching team the next year, another five or more students would be reading and writing their own stories independently by the end of year 3. So we know it is possible for more Warlpiri children to master literacy earlier than the current numbers.

Teacher-linguists are aware of some of the successful strategies used by skilled teachers and teaching teams in the past but it is hard to get other teachers to use these strategies consistently. Warlpiri teachers are good at eliciting whole class responses but are reluctant to focus on individual children, to ensure that they understand the activity and are not just guessing or echoing the correct response.

At one time Yuendumu had a position for a teacher of the hearing-impaired. David Price held this position.<sup>11</sup> One useful strategy he introduced was to get children to

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<sup>11</sup> Dave Price was employed as Teacher of the Deaf at Yuendumu in 1980s. As the majority of children had hearing loss Dave worked with every class and encouraged teachers to use some of the techniques used in teaching hearing impaired children.

watch the teacher's mouth as the sound to be learned is produced, teaching them to recognize the mouth shape even without the sound, and to link this with the written letter shape. It is a big jump to go straight from a sound to a visual symbol. A sound (which is essentially meaningless) is hard to remember. While doing preliminary testing of sound/symbol

recognition in Yuendumu school, I found many children simply guessed repeatedly, hoping to stumble on the right noise. Some gave the same sound for every letter. Many gave words beginning with or containing the sound. Many were unable to hear if the sound was present in given words or syllables.

Focusing on the mouth shape provides an intermediate step, from sound to mouth shape, which produces a visual-to-visual link, the letter representing the sound and the mouth shape. It provides an extra clue to the particular sound represented by the letter which makes it easier for children to remember.

Theo Toyne worked as a mentor at Yuendumu school in the 1980s. She used another strategy for encouraging the use of phonic skills in beginning writing. She encouraged children to write any letters for sounds they did know and could hear in the words they wanted to write, and simply leave out the other letters. She encouraged the Warlpiri teachers to use this method of teaching individual writing. As the vowels were taught first<sup>12</sup>, in the beginning stage children's writing was comprised only of vowels, but placed in the correct order. As children learned other letters these were added. Afterwards the teacher would correctly write the child's story as "read" by the child,

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<sup>12</sup> Initial sounds and letters were introduced first in Year 1 but children didn't remember them. The vowels were taught more formally in Year 2 in preparation for learning syllables.



and the child could see how many letters they had right. They could then copy the correct version.

This strategy was an adaptation of Donald Graves' "Process Writing", which encouraged pretend writing followed by invented spelling and stressed the child's ownership of their own writing. This is a fine method for teaching writing, which has often unfortunately been reduced to some teachers becoming obsessed with getting children to produce perfect copies of their writing. Hood and Soloman (1985) warn against this tendency to focus children on "a neatly written correct model of written language", as this can be seen as the only acceptable writing, and the production of it as the only purpose in writing.

## **Section C - Why Warlpiri?**

### **12. The importance of teaching initial literacy in Warlpiri**

Some teachers, when they see children not succeeding in learning to read either in Warlpiri or English, suggest that children would be more successful just learning English literacy. Teaching literacy in just in one language, either English or Warlpiri, would alleviate only one of the problems, that is confusion with some sounds. All the other problems, from poor attendance to failure to remember the letters, would be the same. Teaching English only introduces another set of problems, the most serious being that young Warlpiri children have little understanding of English.

I think in the days before Bilingual (or TwoWay as it is now called) education, many English-speaking teachers were more successful at teaching phonics. Children could "read", as in saying the string of words in order, but their scores on the Endeavor

comprehension cards which went with the readers, were very poor. Most did not go on to become readers for life.

As S. Harris (2000) states, "In my opinion, the major cause of the grade 3-4 plateau in remote schools in English, is insufficient context for new Western/English knowledge to be integrated into. The human brain cannot operate without a contextualised meaning system." A bilingual program does not solve this problem for English reading at Year 3—4 level, but it does allow children to continue developing literacy skills in their own language and if, or when, their understanding of English is improved enough, they can move on in later years. The worst practice in terms of promoting a love of reading is to make children read material they do not comprehend.

Cummins (1974) hypotheses are still as relevant today as when bilingual education started in Yuendumu, namely, that, " language development in L2 [the second language] is dependent on development in L1" and, "learning in a well known language is more efficient than learning in a poorly known language”.

Bauersfeld (1980) speaking of students learning in a second language writes:

While teachers and children are using language to interact, they are all behaving according to their own actual subjective realities. Hence teachers and students are frequently at cross purposes even they both believe they understand what the other person is saying.

I think this happens much less with local Aboriginal teachers, but it can still happen, especially in literacy and maths sessions, because the Aboriginal teachers learnt these very foreign disciplines in English, using the serial methods of synthesis of information

typical of Western thinking. They then teach as they were taught. These teachers are the exceptional few who did achieve some success in Western education at Yuendumu. Among the children they teach there are still only a few who master the foreign ways of thinking.

There are many reasons for teaching Warlpiri literacy to Warlpiri children, and most of these relate to the maintenance of language and culture. The following section describes these reasons in more detail.

Warlpiri community elders are concerned about Warlpiri language maintenance. In the last 20 years Warlpiri has been lost in one majority Warlpiri community where Aboriginal English is now the language of interaction. The Warlpiri language has been lost in this particular community in spite of parents speaking to their children in Warlpiri, as the children persist in speaking to each other in Aboriginal English. Aboriginal English takes many forms. It may manifest as a language comprised mainly or entirely of English-derived vocabulary but pronounced very differently and using a different grammatical structure. It does not assist children to learn Standard English and can be an impediment to communication in the wider world. In addition it is a handicap in education as English-speaking teachers often believe students have the same understanding of English as themselves.

Warlpiri teachers and parents see teaching children to read and write Warlpiri as one way of helping children to grow up speaking Warlpiri. At an Australian Aboriginal Language Association Conference, held in April 1989 at Hamilton Downs and written up in *Keeping Languages Strong*, almost every language group report suggested using vernacular literacy as a way of keeping language strong.

For example, the Warlpiri group resolved to:

"Teach children to read and write Aboriginal languages."

The Barkley Region group suggested:

"Record stories onto cassettes and into books to teach young people".

The Alekerenge group said:

"People need to read and write own languages"...."Make language kits and literacy courses designed by people in the community".

The Utopia group noted:

"Atnelyeeye mob want to learn how to write so they can teach their kids" and suggested,

"Put Alyewarre language in a dictionary".

The Santa Teresa group recorded:

" Children to be taught reading and writing in Arrernte before English."

And the people from Yipirinya said:

"We write them (stories) down for them to read, to teach them in school".

An example of language maintenance resulting from use of the language for literacy comes from Paraguay, which is the only South American or American country where the indigenous Indian language is the country's main language and the official national language. This is attributed to the practice of the original Jesuit missionaries who learned the language, taught in it, wrote it and conducted all official business in Guarani. The Jesuits are long gone, and unfortunately, these days, all schooling is in Spanish and the problems sound very familiar.

Krivoshein de Canese writes that the poor competence of Paraguayans in general in Spanish is due to an Education system where instruction is in one tongue, Spanish, which most children (60%) don't speak or understand, and those who do learn Spanish,

learn it in a deficient form. However, Paraguayans are proud of their first language and voted to make it their official language in 1992 (Krivoshein de Canese, 2003).

Literacy is a large part of main school business and gets a significant share of the timetable. It is taken seriously by principals who want to see term plans and records kept of children's progress. This emphasises the importance of Warlpiri language usage both to the children and to the school. Warlpiri literacy can only effectively be taught by Warlpiri teachers or Assistant Teachers. It ensures Warlpiri teachers play a leading teaching role for a large part of the school day.

There are two advantages in Warlpiri children having Warlpiri teachers: they have role models that they know they can grow up to emulate, and they learn to talk about both the traditional world and the contemporary world in Warlpiri from sophisticated adults for a significant amount of time each day. In addition, Warlpiri text can be a useful tool for conserving and passing on traditional knowledge, which is very important to the community who seek to preserve the traditional culture.

Warlpiri literacy allows people to pursue activities such as song writing and singing, letter writing, reading the bible or local papers in Warlpiri. Warlpiri literacy skills are required for specific jobs in Art Associations, Warlpiri schools, Media Associations, bible translation workshops and bible classes. This is because these jobs require translation from Warlpiri, for example in the Art Associations the 'stories' relating to the paintings must be collected and documented, and translated for the Certification of Authenticity required by purchasers.

The biggest threat to minority languages comes through their perceived lack of status in the eyes of young people who may choose to take on the majority language to communicate with each other. Because Anglo culture is so dominant, so much materially wealthier, many Aborigines develop an exo-centrism, seeing Anglo ways as right, good and superior and their own culture as backward and inferior. School can either reinforce this negative self-view or with strong, confident Aboriginal teachers, promote self-esteem and strong identity. Teaching Warlpiri literacy in the school improves the status of Warlpiri in the eyes of everyone, White staff, Warlpiri staff and students.

As Nicholas Ostler, President of the Foundation for Endangered languages writes:

curbing the young, corralling them and their fresh impulses within traditional bounds, is a recipe for stagnation for every-one: but allowing them to disappear and lose touch with their origins leaves them ultimately rootless, their elders abandoned, and the rising generation feeling cheated that their heritage has been allowed to disappear. The home fires have to be kept burning until the boys (and girls) come home. (Ostler, 2002)

In the context of Warlpiri communities, this means using the language wherever possible throughout schooling and allowing children to continue to develop their first language. Then, even if they abandon it through teenage years, they can easily fit back into a Warlpiri-speaking community when they are ready, and can raise their children speaking Warlpiri.

If a language can not be used to pursue modern activities, such as reading and writing it becomes redundant in these domains. There are many modern language contexts where

Warlpiri is not the most suitable language to use, (for example, for talking about car repairs and car parts) but literacy can be taught and practiced equally well in Warlpiri.

As soon as written Warlpiri was seen and used in Yuendumu school, the status of the language was raised in the community. Warlpiri people and children saw it as more equal to English. Warlpiri literacy was introduced in every class throughout the school. Attitudes of the white school staff changed almost overnight. The Warlpiri staff were no longer simply given commands by the white staff. They became essential to the delivery of the school program. White and Aboriginal teaching teams worked together for an hour after school every day to plan and prepare for the next day. Warlpiri language and knowledge could no longer be ignored, dismissed, trivialized or outlawed. Warlpiri staff in Yuendumu school have retained their status among white staff.

### **13. The role of first language proficiency in developing second language skills**

Cummins (1997) writes:

Children whose home language is not being adequately developed and who are not becoming effective speakers of a second language in school must be considered at risk. Such children can easily suffer intellectual and academic retardation and may cease to have identity with their cultural group while failing to establish such links with the contact group. (Cummins, 1977)

Dawe (1983) writes,

The ability of a child to make effective use of the cognitive functions of his own language, is a good predictor of the ability to reason deductively in English as a second language.

There is a substantial body of literature which shows the importance of adequate first language competence for overall cognitive development and for successful second language learning. However there are still many teachers and politicians who believe the brain is like a cupboard with limited space and that the first language must be moved out to make room for the second language. In fact the brain is more like a tree; the more branches it develops the more potential branches and the richer the foliage. Cummins (1981) shows with diagrams that learning through separate languages does not develop distinctly different sections of the brain. Input through each language contributes to overall cognitive development.

#### **14. The value of minority languages**

All Australian Aboriginal languages are vulnerable to extinction due to English education, media influence, urbanisation, social disruption and to pressure to conform to the mainstream way of life.

Loss of a language is a loss to all of humanity. As Ostler (2002) says:

... all cultures have fostered and preserved in their language traditions, distinctive learning, which is of continuing benefit to their own people, and at some point may benefit others.

Aboriginal languages, because of their difference from other languages, have a lot to contribute to western knowledge, anthropology, psychology and sociology, to the natural science of their local area and of course to linguistics.



## **Section D – Why an interactive computer program?**

### **15. Rationale for using an interactive computer program**

#### **The suitability of phonics content for an interactive program**

Interactive computer programs are most suitable for introducing and reinforcing skills where there are straightforward right and wrong responses. Phonics is the most mechanical component of reading and requires less complex feedback than interpretative responses. Therefore it is logical to create an interactive computer program to teach phonics and this program *Lata-kuunu* is intended to do this.

#### **Children's persistence at computer learning**

Children enjoy using computers, and will persevere at computer activities longer than at most classroom activities. In the computer room at Yuendumu school the students mostly just do word processing, use draw and paint programs, and play with a few learning programs. The learning programs are all in English and not entirely suitable. However, children will work independently at these programs and it is possible to supervise a class of children at one time working on separate computers. This is unlike the normal classroom situation where it is difficult to get children to work independently. Children can work through a computer program at their own pace and they get immediate feedback.

A program for Warlpiri phonics, *Lata-kuunu*, could work better for Warlpiri children than English programs as they would understand the directions in their own language,

they would know the vocabulary used and be able to discriminate the sounds. The program could be made more relevant to their life experience and humour.

A computer can not totally replace a teacher for teaching phonics because the available computers will not register a child's verbal responses. The computers at Yuendumu school only register mouse or keyboard responses. However, there are activities which would provide a good backup to teaching and provide an opportunity for more practice in listening and letter recognition.

Some strategies which have been successfully used by teachers, would be suitable for conversion to a computer program; for example, linking the letter shape not only to the sound but also to the look of the mouth as the sound is produced. Using the software program Macromedia Director it is possible to have animated graphic representation of the mouth producing the sound as the letters appear on screen.

The other strategy which could be transferred to a computer program involves getting children to type in the sounds they can recognize in words and type spaces for the letters they do not know. These activities could later be adapted for teaching English reading.

### **Visual-spatial learning as opposed to verbal learning**

Some studies suggest that traditional classroom teaching where language is the predominant medium of teaching is not the most suitable learning experience for Aboriginal children. For example, Davidson & Klich (1984) note children were using: simultaneous or synchronous rather than successive or serial methods of synthesis of perceptual information. ... such children are at a disadvantage in

classrooms where language is the dominant medium of the teaching/learning process and learning is based on successive, or serial, analysis and synthesis of ideas and facts, typical of literacy and Western thinking" 1984)

Bishop (1986) argues that:

We need to enable children who experience difficulty in learning through language alone to have another avenue of attack, allow children with strong spatial orientation to make better use of it in learning, for example represent spatial understandings through drawing, modelling, simulation before or along with talking. Spatial strengths can be used to provide a foundation for verbal learning.

Dawe (1983) found that Aboriginal children were using a combination of complex visuo-spatial thinking and verbal-logical reasoning and that bilingual children often switch from one model to the other during the reasoning process and also that this switch was often accompanied by a language switch as well.

I have seen children suddenly able to work out problems when they can visualize. For example, a girl was looking blankly at a maths exercise requiring adding two amounts of money (e.g. \$50.40 + \$75.70). I read out the amounts. She suddenly lit up and told me the answer almost instantly. I said, "How did you do that?" She started touching the desk and said one \$50 and three \$20 and one \$10, one \$5 and two 20c and three 20c and one 10c, touching a different spot on the desk for each note and coin as if she could see them. She could not add the figures. She could however visualize the money and

knew the combinations making a dollar, \$10 and \$100. Some of the most illiterate people at Yuendumu have a good understanding of relative amounts of money.

Davidson (1979) studied the way Aboriginal children play cards at Bamyili (Baranga). He found they did not use the numbers on the cards to identify them, nor did they add to find the scores. Rather they used complex systems of pattern recognition and grouping in which all combinations of cards for all possible scores were known before the game began.

Children and adults at Yuendumu used to play a patience game where cards were put down in a vertical line. They could use the top and bottom cards, or the bottom two cards, or the top and bottom two cards to make 10 or 20. These could be discarded. The aim was to discard all cards. They played at lightening speed. They had to know all the combinations that add to 10 or 20. They learn these games by watching. Their watching is very focussed.

You hardly ever have to show Warlpiri children how to do things they have often watched others do, e.g. how to change gears in a car, use keys and padlocks, play adult ball games, play video games, operate tape recorders, TVs, CD and video players (including doing the more complex tasks such as recording), play guitars, drums and keyboards, prepare food, mind infants and change nappies etc.

An interactive computer program, because of the visual component, can perhaps be more learner-friendly to children with well-developed visual memories, than a teacher talking and questioning in the typical Western way of teaching.

Bishop (1985) writes

School maths is one component of a pervasive and almost world wide Mathematico-Technological (MT) culture. The maths and logical meanings are realized in the lexico-grammatical systems that operate within the languages of societies which are part of the MT cultural group. Many languages spoken outside the MT culture lack the register, both vocabulary and logical connectives necessary to encode understanding in the MT culture.

Bishop quotes Halliday (1974):

This does not mean that people are unable to perceive classifications inherent in the MT culture; it's just that they do not attend to them.

Bishop suggests that "concepts can be talked around in the everyday language of life".

The problem with doing this in Warlpiri is that it is very wordy and tedious. At Yuendumu, at a series of workshops, two Maths books were made where maths operations were "talked around in everyday language", transcribed and printed with photos of the maths processes.<sup>13</sup> Each simple sum took a long paragraph of complex Warlpiri to describe. No one uses these books. They are extremely boring to read. Warlpiri children can learn much more quickly and enjoyably by watching and doing

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<sup>13</sup> "Pipa Nampa-pinki-kirli manu Nyajangu-kurlu Bilingual Warlpiri-English Mathematics Book."

Willowra Workshop, Warlpiri Literature Production Centre, 1984

"Karlara-kari karlara-kari-kirli... Warlpiri Triangle Maths Workshops Willowra and Yuendumu, Nov. 1985 and Sept. 1986 Bilingual Resources Development Unit Yuendumu, 1987

the operation, using non-specific language (e.g., put these here and those there) and learning the maths symbols, +, —, =, ×, ÷.

Language is usually needed to relate the operation to some useful practical purpose. I am not convinced that it is always needed for understanding of the actual process. I think a lot of conceptual learning can be done visually, developing internal visualization skills. I do not entirely agree with Vygotsky that "all thinking is internalized language"<sup>14</sup>. Some memories and projections are visual and these can be used for solving problems. I doubt that only verbal thinking is used in doing jigsaw puzzles for example. Composing music does not need to involve language. Does this mean that it is not thinking? I believe we all use both verbal and non-verbal thinking. The verbalized thinking is just much more accessible to the conscious mind, to perceive in an objective way.

My son Don Baarda, who studied aeronautical engineering, proposes that the reason all of the small proportion of girls doing the course had dropped out by the end of third year was because they wanted everything explained in words. He believes there is a point in engineering where words alone are insufficient. You have to be able to visualize. His suggestion is that girls learn to talk earlier and are so good at language they come to rely on it too much.

I think that literacy in a phonologically written language also demands serial methods of synthesis and the logic which is characteristic of the MT society. The degree of

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<sup>14</sup> Vygotsky, quoted by Devlin, B. at Australian Indigenous ESL Teaching Workshop, NTU Sept. 2002

abstraction from reality is many steps away. Two or more abstract symbols (letters) combined in a particular sequence produce another abstract set which represents a sound which is only part of a series making up a meaningful word. The conventions of serial, synthetic thinking are so well established in the MT societies that they are probably used for dealing with abstraction at much more complex levels.

You really have to speak and understand Warlpiri very well to make sense of the complexities of kinship and ceremonies, and to follow related conversations. Likewise, there is a point in maths and technology, and I suspect in MT society literature, where you really have to understand an MT society language very well to make sense of it.

Possibly the serial method of synthesis of perceptual information is a fairly new type of thinking for humans. It may have grown out of the need for serial synthesis for numeracy and literacy. Modern languages reflect and require serial thinking as word order determines meaning. Old languages have a much freer word order. You can put the words in whatever order they occur to you. Subject, object, adjectives pertaining to these and other cases are determined by case endings.<sup>15</sup> Serial thinking or serial word order, either may have come first, or perhaps they evolved together.

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<sup>15</sup> e.g Pakarnu wita-ngku maliki kurdu-ngku (hyphens have been inserted to highlight the suffixes)

(lit. Hit, little, dog, child )

meaning: The little child hit the dog. (“little” goes with “child” because they both have the subject case ending). The words in this Warlpiri sentence can be said in any order. There are rules about the order of Warlpiri suffixes but they have nothing to do with meaning.

Learning itself is not serial or orderly. As Tutty (2002) writes, "Knowledge is messy and ill-structured". Tutty quotes Horton (1994) on the acquisition of knowledge.

No general rules apply without exception to all cases. Categories overlap and no simple hierarchical scheme is possible. There are no pure cases or perfect prototypes. Factors critical in one case are unimportant in others. Each case appears singular and defies simple analysis.

Tutty suggests that on-line learning, with flexible random links between pages of information, models an interconnectedness that is core to the notion of knowledge. I wonder if young people, learning complex topics in this random way, will actually think differently than the learn-through-books generations who have had knowledge presented serially and logically classified.

If Warlpiri people are to take on joining the work force and running their communities, at least some of them have to master the understandings of the MT society. The first step is literacy and numeracy and if computer programs can improve attainment through a more visual –spatial approach, then the other thinking styles could be learned later.

S. Harris (1989) suggests that the best and perhaps only way for Aboriginal language speakers to maintain their language and culture, world view, values and unique ways of thinking and communicating, is for them to treat all Western learning and interactions with Westerners as a giant role play. They can then consciously act and think as Westerners in the situations where it is needed and keep their own thinking going at the same time. This might be better understood if we imagine how it would be if we Westerners were invaded and occupied indefinitely, by a race of robots which used a



computer programming language for all communication.(e.g.TRUE would simply mean the existence of a given condition, regardless of the correctness of that condition.) We would learn to use this language and logic, but to maintain our own language and logic we would have to be constantly aware that we were using a foreign logic and keep our own “real” thinking going on underneath. For problem solving we could bring both systems to the task. We might find, as Dawe (1983) found with Aboriginal children, that a shift in the logic model used in reasoning, would be accompanied by a shift in language. Those robots working at equipping us with some robot mainstream skills might find it productive to begin our instruction with activities which would be more suited to our indigenous learning styles.

## Section E - additional relevant issues

### 23. Discussion

#### Electronic learning: the good news and the bad news

Here is a summary of the main ideas I have found in the literature review on electronic learning.

- If given opportunity and freedom to explore by themselves, children of many backgrounds can learn to use computers very competently.
- Children who have computers at home have a great mainstream educational advantage over those who don't.
- Children who grow up using computers and the internet are different from children who don't and from their parents.
- Using computers in schools is beset with problems.
  - The curriculum still supports the view that the main thing to be taught is to work with pens and paper and read books
  - Computers may be provided to some schools but often no technical assistance, no specialist staff, no information about systems or software
  - Teachers are given no extra training, time or support for integrating computers into their programs
  - Even when teachers are knowledgeable about computers, school administration is often obstructive
  - Even where all children are able to work on computers, privileged children are often creating and exploring while disadvantaged students are doing exercises.

- In the U.S.A. computers are donated to some schools in return for using children to advertise and for rights to sell only the company products in school shops.
- Some education officials and interest groups see computer education as a step towards preparing children to serve commercial interests and towards the privatization of schools.

### **The proliferation of electronic interactive media**

After reviewing the literature on electronic learning programs and internet courses, I was amazed at the great number of programs and courses and the limited evaluation of their effectiveness, especially the lack of statistical data and analysis on actual learning outcomes.

The main feeling I'm left with after my internet excursions, is that there is a kind of madness out there which I am now a part of. I used to compare the Warlpiri with some unlucky aliens in the third book of the "Hitch Hikers Guide to the Galaxy" who had their central intelligence knocked out by a meteor while they were hibernating. When they woke up they found they had some highly developed skills but no knowledge of any purpose for using them. They were very good at collecting and processing information, so that's what they did, but with no purpose as they had no idea where they were, where they were going or why. The Warlpiri are sort of in the same boat, with highly developed navigation and hunting and gathering skills that are no longer required, and a ritual life based around increase ceremonies for foods they no longer rely on, some of which are no longer found in this area, and some which are now extinct. But perhaps it is us First Worlders who have had our central intelligence knocked out, and we are now engaged in this manic proliferation of technology, every

little piece with its own rhetoric about some practical application. But since there appears to be so little attempt to find out if, in fact, the purpose is actually being achieved, I wonder if the primary motivation is really to try out the technology. The most disturbing thought is that we might even be engaging in wars, for some stated necessary reason, but in fact just to try out the technology.

### **The power of the internet**

The internet is much more than a vast collection of resources and a communication tool. It is another opportunity for exploitation by corporate bodies and interest groups. Children quickly learn to be active participants but they also need to develop a sophisticated reading of hidden agendas. There are other anti-social predators on the net too, as we have seen such as the child pornography groups exposed on TV programs and paedophiles who get to know children through the internet and lure them to meeting places. I wonder how many don't get caught. How awful it is that children you think are safely at home, are not safe. What amazes me is the extent of emotional attachment that can be generated just through reading printed messages on a screen and perhaps seeing a few photos. People are making friends and falling in love on the internet. Even in Yuendumu the young Warlpiri woman who does the jail link ups through compressed video, in her spare time uses the internet and has a friend in Canada. She said, "Every time I hear ping, ping, ping, I get happy because that's my friend in Canada".

### **Use of electronic media in Warlpiri communities**

In Yuendumu there are many video games, nintendo, and play stations in Warlpiri homes. I think all children have some access to these games though it seems to be

mainly boys who take over. A great variety of games are played from "Mortal Kombat" type karate and wrestling, to games based on popular films, e.g. "Toy Story". The graphics in these games are fantastic.

At first there used to be about 30 children sitting around a game. Now it is usually only three or four. Children seem to get sick of the same games. They go wherever there are new games. When they play motorbike or racing car games they like to deliberately crash to see how many different crash sequences there are in the program. In fact they are a step beyond just playing the game. They are looking at what the programmer has put in.

### **Warlpiri children's skill with computers**

Three Aboriginal families in Yuendumu have computers that I know of. Because of the way things are shared under the social structure system, this means quite a few children get to play computer games. The children are quite at home with navigating around the virtual worlds of Leggo Island II, Matchbox Rescue, Age of Empires and Harry Potter.

Age of Empires comes as a free CD on the Nutrigrain cereal packet. The young ones call it Age of Vampires, though they know there are no vampires in it. The game has a lot of complex written instruction but the children work it out by trial and error and are able to build villages and forts and sailing boats, conduct battles and shoot crocodiles, deer, elephants and whales. "An elephant is 100 meat" they told me.

### **Children's contribution to *Lata-kuunu***

I do feel a bit discouraged about *Lata-kuunu* when games with this sophistication of graphics and complexity of interactivity are freely available. The thing that is heartening is that when children watch me working they are interested in this Warlpiri program. They bring other children to see it. They have favourite bits they demand I show other children. They make suggestions which I feel obliged to implement, while they stand over me.

For example I thought the joey popping its head out of the pouch would be sufficient animation for the word *marlu* 'kangaroo', but an 11-year-old Warlpiri girl demanded I make him hop. She was not happy with my first attempt so she did a little hop around my little office room, crouching a bit between hops. She stayed all though the tedious process of animation until she was satisfied. The original animation where the joey popped its head out, is now a fraction of a second sequence before the first hop. However other children watching this sequence always remark on the joey. It is more interesting to them because it is so quick. They are very visually tuned in and able to focus on very small changes in their surroundings, and especially movement. Before I even see a lizard on the ground, they have caught it by the tail. I have often noticed that, when ask them to tell me what a video was about, they can describe in minute detail a short action sequence such as a fight or a person falling. I am now making animated sequences as short and fast as possible.

There is animation in Phonics Alive where a crocodile eats the letters. A boy suggested I should make the goanna eat the letters. We got him to eat one letter and then the boy recorded the burp, which he is very pleased with and likes to show other children. Children also enjoy recognizing the children's voices saying sounds.

On different occasions two older children asked to play the game. I happen to know they are both poor readers. I let them play because they are in post primary and will not be trialling the program. They did not get sick of it at all. I eventually had to stop them so I could get on with making it. They made me realize I need to put in more different comments, for the different mistakes they made. This means recording a whole lot more teacher responses and making more complex "else if" interactivity. Most of their mistakes were because they disregarded the instruction and tried to type what they knew of words. I realize I also need to have a button for repeating a word and an instruction in case they weren't paying attention. These refinements haven't been added yet.

### **Importance of Warlpiri Iconography**

I also think that a large part of the problem of literacy in Warlpiri children is the very foreignness of our writing system for children growing up with a different representational system. Outsiders might think that Warlpiri iconography is a thing of the past used mainly by old people. This is far from true. Traditional iconography is alive and flourishing in Central Australia.

The role of the art centre in preserving the traditional iconography is critical. The art centre has been operating in Yuendumu for approximately 18 years. Warlpiri art has been exhibited widely in both Australia and internationally, and is in many major public collections such as the National Gallery of Australia.

In the financial year 2000 – 2001 Warlukurlangu Artists Aboriginal Association at Yuendumu had 318 artists painting for them: 150 women, 70 men, and 90 young people

under 18. In that year, turnover was \$440,000 and it was considered a bad year. Sales are up again now beyond \$600,000 this year. Although all the major artists are older people, young people are encouraged to paint and given smaller boards which sell to tourists. Both major sales (up to \$50,000 for commissions) and small sales, from \$10 to \$100, create a huge financial incentive for people to paint, and all the paintings are of traditional stories using Warlpiri iconography. Since canvas is only given to artists whose last work has sold, many people get their own paints at the shop and sell to road houses or people they know. In every camp there are nearly always people painting, either for the art centre or for these private sales, and much conversation is about the paintings and their stories, which keeps the iconography very much alive.

### **Warlpiri children's confusion between Warlpiri iconography and the alphabet**

Warlpiri children's drawings are a blend of traditional symbols and western representational art. They are often truly aligned on the North, South, East West axis, as in reality, and present a bird's eye view of the scene they are depicting. Even young children are surprisingly accurate in producing diagrams of their house or camp and surrounding features and where specific people were sitting or sleeping.

When little Warlpiri children begin play writing they do not do the lines of squiggles and then start putting characters in lines, as Graves has identified as a normal part of the process of learning to write for Western children. Warlpiri children spread characters around the page. It is doubtful whether teaching them to do lines of squiggles would be useful for them as the Western children who are copying the behaviour of adults writing, putting down lines which they know make a meaningful story.



Warlpiri children rarely see their own parents writing. Even when required to copy a line of writing (their own experience story dictated to the teacher) Warlpiri children do not copy the letters in order but pick out different ones and spread them, even arrange them around the page with no regard to which way they face. Some are upside down. They are copying adults paintings, putting characters around the space available in the way that they know makes a meaningful story. Some of the characters look the same as the ones they know.

For example, the capital E is a stylized possum footprint and represents possum in Warlpiri art and story telling. “C” is a person sitting, “O” represents many things according to context: a water hole, a tree, a plant, a bush tomato, or a dog sleeping. “L” represents a boomerang. “I” can be many things: a spear, a person sleeping, a digging stick. “T” has a name and used to be sacred. “S” is a snake or water, and so on.

Many children appear unable to copy a line of writing even after a year or two at school. They just do not accept that it is important to copy characters in order, in a line with spaces. You only put things in a line in a Warlpiri painting when the story is about things in a line, like people dancing at a ceremony. The left—right significance is also hard for them to learn, as they are so cardinal direction oriented. This means they might get the letter “a” right when they sit facing west for example, but next time, if they sit facing east and put the stick on the north side again, this time it will be wrong.

### **Teaching solutions**

Warlpiri teachers have found ways of explaining why letters are sometimes wrong, for example a letter “a” can’t be lying on its tummy or on its back or be falling over and it

must always face back. They also say that syllables are like married couples. We can use these explanations in the computer program.

Like the Kantaro program to teach Kanji, teaching the alphabet characters to Warlpiri children involves a lot of memory work, remembering which character says or means which of a large number of possibilities. It is very hard when there is nothing in your memory or past experience to relate to. I agree with Langer (1994) who views feeling as the threshold of thought, “the moment when neuro-physiological activity is presented to consciousness”. Every word, image, memory or understanding that we learn, retain or mentally manipulate is connected to emotion and to all other memory linked to that emotion, to a greater or smaller degree. Without a link to the underlying emotional network there can be no integrated learning or even recognition that the thing in question has been experienced before. The mind is a great web of associations. The emotions are the surviving survival instincts which provide motivation and serve as reward and punishment.

For most Western children their memory, both conscious and unconscious, is full of occasions when texts (books, writing, letters, messages, invitations, signs etc.) were present at the same time as significant carers and texts played an integral part in significant situations. For Warlpiri children there are few if any such memories. There is no emotional base for remembering English letters just as for Western students there is no emotional base for learning Kanji. I think the key is to link the characters with images that probably are connected to the emotional network and this is something that can be done with multimedia.

### **Equity in the use of computers in education**

A number of reports stated that children from privileged classes were given creative computer projects while the less privileged were given what amount to workbook drills on the computer (eg. Gomez, 1994). I feel that researchers may be unaware of the vastness of the gulf between children from homes where literacy is second nature and children from homes where it is not. Perhaps some teachers do prejudge coloured and poorer children, denying advanced learning opportunities to some who could benefit from them. However, I suspect that most teachers with large classes are forced to just give children whatever work they can do fairly independently, because they are too busy to give the less privileged children the time and one-to-one help that most of the privileged ones have received at home. Until children have a very good command of literacy and the concepts of the MT culture they are unable to advance in word processing, programming or using internet resources.

Bush teachers are often accused of having low expectations when we ask for curricula or tests that take account of the different needs and skills of bush children. It is said to be discriminatory to have different expected outcomes for different children. But no amount of high expectations will enable children to engage in activities if they do not have the necessary basic skills to bring to the tasks. The first most basic requisite is literacy. If a program teaching basic skills can contribute to literacy attainment, students then have a chance of engaging in the creative and problem solving programs later on.

I see a more serious inequity in Australia between city and rural populations. Most rural areas have no or poor internet access because of the inadequate phone lines. At least some children will probably still be growing up exploring reality.

I think for years schools have discriminated against boys with their emphasis on early literacy, verbal learning and slow repetitious activities. It has long been known that boy's physiological development and language development is slower and they are stronger in visual-spatial learning. When I heard on the news (December 2002) that for the first time in many decades boys had taken out the top honours in humanities I immediately thought maybe computers are working for the boys.

## **Section F – Design and Construction Methodology for *Lata-kuunu***

### **16. Conceptual Framework for the computer program *Lata-kuunu***

The idea for this program, *Lata-kuunu*, came from the English phonics program called *Phonics Alive*. A few of the activities used in *Phonics Alive* have also been adapted (for this program *Lata-kuunu*). However, *Phonics Alive* is a reinforcement program and assumes a lot of prior knowledge of letters and the way they work as parts of words. *Phonics Alive* deals with all letters initially as beginning sounds and final sounds even though the vowels are later introduced as middle sounds. Warlpiri vowels cannot be introduced in this way as vowels never occur at the beginning of words.

Observing children using *Phonics Alive* made me aware of extra steps needed to help younger children do the exercises, and also of the need to avoid activities that promote repeated guessing, because they can progress through a program like *Phonics Alive* without learning the letters.

The purpose of this program, *Lata-kuunu*, is to teach Warlpiri children to correctly: identify the sound of the letters among others, identify the mouth shape relating to that letter sound, identify that letter; hear the sound in words; hear it as a final sound, hear how many times it occurs in a word, and type the sound when they hear it in a word or syllable. The computer program will not teach the particular handwriting skill. The program does ask children to trace the letter on the screen as it is drawn but it can not record their response. What is needed for Warlpiri children is a program that assumes no prior phonics understandings and no prior letter recognition.

As a result of the observations of children using *Phonics Alive*, some guiding principles for designing the Warlpiri program *Lata-kuunu* were devised. These are as follows:

- Teach one letter at a time. Children cannot proceed until they can: correctly identify the sound among others; identify the mouth shape; identify the letter; hear the sound in words; hear it as a final sound; hear how many times it occurs in a word; and type the sound when they hear it in a word or syllable.
- When children know two or more letters thoroughly, they must be able to type the right sound into words with missing letters.
- Keep exercises visually interesting with animated pictures and meaningful words for finding and hearing letters.
- Get children to use the keyboard rather than have groups of letters for them to point at in turn. Using the mouse alone, children learn to simply click every possibility until they get the reward.
- Keep exercises short to keep the children's attention.
- The program also should be designed so that it can be used more than once without children just remembering the answers. This requires randomizing sequences of words or pictures at the beginning of each exercise, so that the program can be used by the child again without them remembering the right order of responses.

- Avoid rewarding guessing by not providing a number of choices to guess at. After a wrong response explain what to watch for, replay the exercise and note that the correct response is the only way to move on. Children can only move on to another exercise when they are consistently giving correct responses.

Taking these guidelines into account there are additional design requirements. Warlpiri children need learning reinforcement and this program, *Lata-kuunu*, is designed to give children lots of practice in hearing each sound as a separate sound and in different positions in words. The sound is linked to the mouth shape as the sound is made and shown in the written word after the child has identified that it is present. There are 24 exercises just teaching the first letter. This is because Warlpiri children are not familiar with how letters and words work, and have failed to understand: that a letter represents a sound which is a part of many words, that you can hear if a sound is present in words, that the same sound is represented by the same letter in different words, that a sound can be present in a word several times, and that its place in the word depends on the sequence of sounds in the word. These are some of the understandings that children from a literate society have before they begin to learn reading.

The conceptual framework is evolving as the program *Lata-kuunu* is being developed. It is not always possible to replicate live teacher and class activities in a computer program. Other ways have to be found of getting children to respond in phonics activities. The computer program is not expected to totally substitute for a teacher. Class teachers will still be expected to explicitly teach letters, sounds and phonic skills in the context of other literacy activities.

What a computer program can do is give children lots of practice in listening for and identifying sounds and typing the right letters. It allows children to work through a systematic program of exercises at their own pace and when they miss school for a time, they can continue the program from where they are up to. A whole class should not have to revise the same activities because some students were not present

## **17. Early stages of project development**

Originally the Bilingual Resources Development Unit (BRDU) of Yuendumu school planned to make an interactive program which would “teach” all the Warlpiri sounds. Staff of the BRDU, including myself, had worked with the old version of HyperCard, to make simple interactive computer programs for the school. The experience led us to believe we could create a more complex interactive program to support literacy learning. We chose the software Macromedia Director because *Phonics Alive* had been made with it. Also, at the time, the experts we contacted to request technical help recommended Director. Now they are recommending “Flash” as a more suitable program as it uses much less memory. I don’t have time at this stage to learn another program.

## **18 Project Resources**

The first submission for \$20,000 to fund this project was written in 1998 by Michael Harries. We were granted \$18,500 from Commonwealth Targeted Programs, Literacy/Numeracy. We had no idea then how long it would take or how expensive it would be.



Previously, in the 1980s and 90s we had made a series of nine videos for Warlpiri children based on the ideas in Sesame Street. In an eight or ten week session with two people working and with the support of the school and Warlpiri Media staff and resources, we made three half hour videos for \$30,000. This gave us a point of comparison and we believed at the time that \$20,000 was the appropriate amount and that it would take only a few months. However, it has turned out to be a far more expensive and time-consuming project.

The original funding we applied for was to cover equipment, wages for Warlpiri workers as well as technical assistance. In 1999 I sent a Request for Variation form to the funding body and got this changed so that the whole remainder of the grant could be spent on technical help as this proved to be the most expensive component and the most vital need.

We have purchased technical help from the following:

Paul Cockram at Art Plan Tennant Creek

Graeme Sawyer at entity 1, Darwin

Balduino Lopez at QANTM, Darwin

John Helbers, Palmerston

Donovan Baarda, [minkirri.ipana.org.au](http://minkirri.ipana.org.au), Melbourne

Shirley Lam at entity 1, Darwin

A student at N.T.U. Kyle Johnson, designed the reward game, as part of his programming course. This was organized by his supervisor, Jeff Parker, who put up a notice inviting any-one with programming projects to contact him if they wanted a student to work on them. Some of these technical helpers have sought voluntary advice from others more familiar with this sort of programming.

The making of this interactive program, *Lata-kuunu*, is only possible because I had study leave and have now retired. The BRDU at Yuendumu provides the Warlpiri staff needed, the hardware, the artwork, some technical assistance, plus years of accumulated resources and recorded experience in the teaching of Warlpiri literacy. The school provides the children needed for the sound track. Warlpiri-patu-kurlangu, a co-operative organization of Warlpiri communities, received an additional \$3,000 from A.T.S.I.C. to pay Maxine Spencer to continue recording the sound instruction and words for the project, as she resigned from her job as literacy worker at Yuendumu school.

Local bands allow us to use their music. Warlpiri Media Association gives technical help where they can. NT University provides me with a supervisor who has put extra effort into finding resources and helpful literature. All the organizations I have sought technical help from have given extra help beyond the hours they charged for.

This project can only go ahead through a team effort and some possibly unique circumstances. I have been working on this project full time for one and a half years, with lots of help and support and so far it gives only about two hours of instruction.

## **19 Writing the script for computer program.**

The original outline of a script for a Warlpiri phonics program was written by Michael Harries, teacher-linguist at Yuendumu school in 1997. It included pre-reading listening activities, and covered all letters and syllables in the Warlpiri orthography. We agreed to start with the vowels rather than the pre-reading activities or initial sounds, which we felt were being taught quite well in the classrooms. We made a start on the interactive computer program with the letter “a” section in 1998, but did not get past the

introduction sequence. We began to realize that it was a very time consuming process, and would not get very far if it was to be done by a teacher linguist in between all the other duties which are the main part of that job.

From 1998, working with Maxine Spencer, then a literacy worker in Yuendumu school, we fleshed out the “a” script, with advice and ideas from Michael Harries. Writing was the easiest part of this project. As the program is made, lots of changes are made to the original script, to fit in with the capabilities of the Director software. These changes make use of the software’s advantages and the need to work around its limitations. As you work through the program it becomes obvious when more teacher direction is required and the script is then adapted to fit this in. The “i” script, which is the second script, is an adaptation of the “a” script with a few variations as children must now hear and type the two vowels.

## **20. The phonics content of the program**

We have found that most children who master the vowels and the first three syllables in Warlpiri can then go on and learn the next group of three syllables with much less difficulty. Because most children are not mastering the first three syllables, all further phonics learning remains a guessing game.

Warlpiri phonics involves decoding and reading syllables or encoding and writing syllables rather than single letters. Reading and writing Warlpiri words is a two-step decoding or encoding process: letters to syllable, syllables to word. Children learn beginning consonants, e.g. “m”, and then learn the syllables, “ma”, “mi” and “mu”.

There are only three vowels in Warlpiri:

- /a/ (pronounced – “ar” as in *car*, or u as in *cup*)<sup>16</sup>
- /i/ (pronounced “i” as in *win* or ee as in *bee*)
- /u/ (pronounced “oo” as in *wood* or "or" as in *corn* ).

To read or write any syllable, Warlpiri children must know the vowels. Most children have trouble with the vowels. As there are only three, guessing works to a degree for simple letter or syllable recognition. Because of this degree of success, many children cling to guessing as their only strategy. It does not work for decoding words, as a change in vowel often produces a different word and most words are three or more syllables, greatly reducing the chances of success through guessing.

Graham (1988) discusses the problem of children in Aboriginal schools relying on guessing. She writes:

Teachers assume when they ask a question like "How many are there?" that children will actually look at the material and discover by looking or counting, how many objects are present. However sometimes children do not do this at all. They simply play a guessing game. ...[Here follows a transcription of children's and teacher's responses.] ...The children call out numbers, 6, 7, 8, 9, forcing the teacher to give an answer. If the teacher says, 'Close' or gives some encouraging answer, then that lets children go on thinking that guessing is a good strategy.

Graham (1988) goes on to say:

If teachers let children guess in the early years of learning maths they will often get it right. However as they move further up the school it is not so easy to guess

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<sup>16</sup> " ar " as in "car " in Standard Australian English, not American English where the " r" is pronounced.

correctly. Children are then left without any effective strategies. They haven't learned that the answer is not to be found in the teacher's face or in random guesses but must be arrived at after thinking ...When teachers are getting lively responses they feel they are successfully teaching, but what are children learning? (Graham, 1988)

This is exactly the same problem that Warlpiri children have with Warlpiri phonics. The guessing games are lively interactive sessions but children are left with a strategy that does not work. It is important to use alternative strategies that do work. Graham suggests explicit teaching of strategies. She says, " children need to build mental pictures about what is going on" (Graham, 1988). I strongly agree that children need to build mental pictures about what is going on. If they can visualize a mouth shape to go with a sound and associate this with a letter, this is more useful than guessing.

Another problem is the language of instruction, as Warlpiri has no established ways of talking about letters and sounds, and spatial terms carry different meanings than the closest English spatial terms.

As J. Harris (1979) writes,

Other spatial knowledge inherent in the Aboriginal view of reality is quite widespread. When exploring difficulties that many Aboriginal children experienced when working on number lines, it was found in one language that a word was being used for "after" (e.g. what comes after 23) that was related to the speakers point of view. Thus the word could be translated back into English as "before", "after", "previous" or "following" depending on context. This confusion has been found to be quite widespread but it is only through the

extensive use of two languages in education, that many of these confusions have been revealed. Children in English programs, who have been intelligently applying their Aboriginal world view to their newly acquired English terminology have simply appeared stupid to their teachers.

This different use of spatial terms also causes problems in teaching and learning phonics as there is confusion over what is the first sound or letter, the last sound or letter, the next sound or letter, the previous sound or letter, the second letter (which is important in a language made of syllables).

If you are a Warlpiri person you might see the letters as people going hunting, and the ones up ahead are going *kamparru* ('first') because they will get there first. If you are looking from left to right, as we teach children to do when looking at text, the word for 'first' (*kamparru*), when used for letters of a word, means in the Warlpiri way of looking at things, the letter on the right hand end, which we English speakers call the last letter of the word. What we call the first letter of a word is seen by Warlpiri speakers as *pardangirli* ('last'). *Kamparru-warnu* means 'second' in Warlpiri but in relation to a word, to Warlpiri children, looking from left to right, it means what we call the second last letter of the word.

The word for 'next' (*wana*) also means 'beside' and can refer to either side. There are several ways of saying "after" but they have other meanings too and do not work well for talking about letters in words. For example, "*-jangka*" means 'after', 'as a result of', or 'from', or 'after an event or previous state of being' (e.g. *Maliki-jangka yapa-jarrijalku* - 'After being a dog he became a person' or *Ngapa-jangka marna ka pardimi* - 'After rain grass comes up'). You can see the problem if you try to say "a" is

"*m*"-*jangka* (after "m") in the syllable "ma" which could mean 'after being "m" it becomes "a"'. Or it could take the meaning 'as a result of "m", then "a" came into being'.

Over the years of teaching initial literacy in Warlpiri, some conventions have been developed by the Warlpiri teachers. For example, to ask for the first sound of a word you can ask,

*Nyiya-ngurlu ka wangkami?* (literally, 'From what is it talking?')

or

*Nyiya- ngurlu ka jarti-jarrimi?* (lit. 'from what is it starting out?')

("Jarti" comes from the English word 'start', but it carries the same meaning as old words like "*karrkami*" meaning 'starting out on a journey'.)

To ask, "What comes next?" you can ask, "*Nyiyalku?*" – ( lit. 'What now?')

To ask, "What is the last sound?" you can ask "*Nyiya-kurlu yitipi?*" (lit. 'With what on the end?') *Yitipi* means 'on the edge', for example, the person sleeping on the outer edge of a line of sleeping people is *yitipi*. *Yitipi* can refer to either end of a line; the precise end is decided by the context of where the speaker is or the fire or whatever is the understood reference point.

To move from using *Nyiya-ngurlu* to *yitipi* children have to stop seeing the letters as moving along from left to right, and see them as stationary so that the one on the right is not first but on the outer edge. It is not ideal but less confusing than using straight translations of the English terms for first and last.

There is no word for "sound" in Warlpiri except the word for "voice" or the name or verb for a particular sound, e.g. thunder, barking, rustling, exploding, banging etc.

There are no words for “letter” or “syllable” but Warlpiri pronunciations of English words are used, letter - *lata*, syllable - *jilipurlu*. There is a word for “name” (*yirdi*) which works for “word” in most contexts.

I depend on Maxine Spencer, my Warlpiri co-worker in this project, for terminology. If I am not sure how to ask for a particular response she can always tell me. Sometimes she puts in an English word. The sound track for this CD is modern, younger people's Warlpiri, as spoken by people under about 35. It may not meet the approval of linguists who might see the Warlpiri literacy program as an opportunity to reinforce traditional vocabulary. The goal here is student understanding. So far, linguists who have worked on Warlpiri have always been supportive and not critical of locally produced Warlpiri materials which sometimes contain English words commonly used by Warlpiri speakers when speaking Warlpiri.

The problem of letter-sound recognition is further compounded by the fact that children have not mastered Warlpiri phonics before they begin formal English literacy instruction. There is much confusion with English vowel sounds. Children learn that the letter “u” says u- as in cup and often they give this letter its English sound when decoding a Warlpiri word. This can produce a different word, e.g. “*nguku*” (‘drink’) is read as “*ngaka*” (‘later’). Children reading “a” as, a- in apple when reading Warlpiri, produce words they are unable to recognise, e.g. *waku* (‘arm’) pronounced wack-oo (or wackar if they use English “u” sound), sounds most unlike the Warlpiri word they know. Attempts to use English phonics for reading Warlpiri can be quite unrewarding.



Hopefully, if this program proves effective in teaching younger children, they may be able to master Warlpiri phonics before embarking on English phonics thus avoiding teaching children two different phonetic systems at the same time.

The aim of the interactive computer program *Lata-kuunu* is to get children thoroughly familiar with the Warlpiri vowels so that they can type them when they hear them singly or in words, and so they can type them correctly in spaces in words. This computer program is limited because it can not respond to a child's verbal response. However, if a child responds correctly by consistently typing or pointing to the correct letters or pictures, we can probably assume that they can read the sound out loud if required. The program is not supposed to entirely replace the teaching of phonics in classrooms. It is vital that the other aspects of reading be taught at the same time and phonics must be reinforced in all other reading and writing activities.

## **21. Constructing the software**

### **Visual content**

As the BRDU already had access to an archive of video clips of local animals, bush tucker and objects around Yuendumu we originally intended to use actual video clips for the visual content. We thought videoing would be quicker than animation. We planned to use video clips of Maxine's mouth movements as words were pronounced.

However, we discovered the amount of memory needed did not allow the program to run correctly. The program would not run on the school computers used by the children. The pictures kept dissolving and there were delays that made the exercises useless. Worst of all, the mouth movements were not perfectly synchronized with the voice,

completely defeating the purpose of showing the relationship between the sounds and the mouth shapes. All the video clips were then replaced with animated line drawings.

In 1998 when we saw that the video clips were not workable, we engaged Donovan Rice, an employee of Warlpiri Media, to do about 50 drawings for the project. These later had to be modified to remove the shading, as shading complicates animation. Most of the other drawings have been collected from Warlpiri school work-books and story books and scanned and edited to fit the space. On occasions when I do not have a picture for a word I ask a young Warlpiri man, Damien Hudson, to draw it, a spider or mosquito or whatever, and he draws straight into the Director Program. We use an electronic drawing board and stylus (“intuos 2, intelligent graphics tablet system”) which makes it easier than drawing with a mouse.

### **Sound content**

The first sound we used was taken from the sound on the video clips. This now sounds a little distorted and echoey compared to later sound, which is recorded straight into the computer. Maxine Spencer, the literacy worker at the time, has become an expert at this task of recording sound. She has taught Warlpiri literacy so is very familiar with the content. She reads very well and pronounces the Warlpiri very clearly. Usually she does just one take. Maxine operates the program “Sound Studio” with no difficulty. The only problem is that she has now moved to Alice Springs and works at Yirara College so it is hard to catch her when she is not busy, to finish off recording the “i” script.

## Animation

Animation is another skill I have had to learn. Animation using Director is rather different to animation using HyperCard, with which I had been familiar. There are many features in Director which save time but sometimes many drawings are needed. *Lata-kuunu* uses the simplest possible animations with as few pictures as possible. It still takes a long time. I know now in advance what image will be difficult to animate and the choice of words for the exercises is made not only with a view to providing a variety of sound combinations but also to choose an appropriate image for animation.

I used the video of Maxine pronouncing all the words for the program to make line drawings and simple animations. This involved exporting single frames from Adobe Premiere (a video editing program) and importing them into Director, which has a feature called “onion skin” which allows you to trace images. It was not a simple process, as the traced mouth shapes had to be reduced to fit into the face. They were all different sizes as the video clips had been shot at different distances from Maxine’s face.

Reducing causes some distortion and a grey effect on many pixels. Also Maxine was sometimes directly front on to the camera but more often slightly to one side or the other. She also moved her head slightly while talking as people normally do. It took a quite a bit of editing to get mouth shapes that fitted and looked natural in the face. It took a great deal of trial and error to make them fit together as believable animations. I watched some of those video clips of words 50 or more times. The human eye is so expert at observing mouth movements that one frame or one sixtieth of a second out of time and it is immediately obvious and annoying. I thought I could reuse the same

mouth shapes more, but the shape changes depending on sounds before and after and often just looks wrong.

I discovered that the lesser number of images per word the better it works. Now I have a “faces” cast with about 80 mouth shapes that will fit together to make most words. Only occasionally I feel I have to go back to the video clips. Sometimes, after tracing a number of mouth shapes taken from the video of the actual word being pronounced, I still can not get the animation to look normal. Further work needs to be done on this aspect of the program.

### **Interactive programming**

The most complex part of making the program is the scripting to make it interactive. The only interactive programs I had done before this were made with the old HyperCard program, which was given to Apple on condition it was provided free with all new computers.

The lingo for HyperCard is similar to Director lingo. Simple commands are exactly the same. Director is quicker for some things, gives a more professional look and allows more complex programs. However, some things that were simple in HyperCard turn out to require very complex scripting in Director. For example to run items in an exercise in a random order, returning an item incorrectly done to the random selection, was simple in HyperCard. You instructed it to mark correctly-used cards and then go to any unmarked card.

I have been unable to get Director to perform this function. I can only randomise the order of words or pictures and use a command that repeats the whole selection if the

student gets a given number wrong. They then have to repeat the exercises they got right and still may never respond to a certain item correctly if the return-to-start command is set at more than one wrong.

Copying and modifying script examples from the Director handbooks nearly always does not work for me. There is a library of prewritten scripts which work for certain things, (e.g. sound occurring on mouse rollovers) but much of the scripting needed for this program is not in the library.

We have often found that scripts, which were working perfectly before, can suddenly stop working. Before changing a script you have to remember to check if it is used anywhere else or you muck up something else. Non-functional markers and scripts with no content also affect the running of the program, and these can be easily created inadvertently. Also you have to check where Director is putting things or you can never find them and they may be getting pasted over something else. Its not unusual to play an early part of the program and find some images, text, sounds or instructions have disappeared or have been substituted with something else. A boomerang has turned into a butterfly for example.

### **Managing casts**

When I began using Director, I used a book called *Director 8 Demystified*. It was easy to follow and at first it seemed easy to make exercises, but *Lata-kuunu* became much more difficult to manage as it increased in size. As these exercises use the same words, sounds, graphics, animations, and teacher instructions many times over, it is memory saving and in theory convenient to have a number of external casts for the reusable cast members (i.e. sounds, images, scripts, text).

However eventually I realized I had multiple copies of external casts, each slightly different, sometimes with slightly different names, sometimes the same name. It has been a slow process to sort out this muddle, check out which cast hundreds of sprites are in and exchange them in order to have only 9 or 10 external casts. Deleting casts deletes all work using their members. Changing the name of casts makes often only makes two casts with the same name.

## **Navigation**

Navigation around the program has been carefully considered. I have tried to avoid most of the problems found with a previous attempt to introduce computer learning into remote area schools, in designing this program, (see Devlin & Durling in the Literature Review section on page ? ) In *Lata-kuunu* there is a menu with a quit button, always a return to menu button and clicking the section name jumps the student back to where they were up to. Students can go to any menu item.

It is probably easier for beginners to do the earlier exercises first, but not imperative and students who do not need to do all the exercises can leave some out. Teachers can look at as little or as much of a section as they want to.

After wrong responses there is teacher explanation of what to pay attention to, how to get it right and always a second chance. More bounce-back to original demonstrations are needed and will be added once the basic program is completed.

Instructions are short and verbal although there is a short translation of the task written in English at the bottom of the screen so those teachers not fluent in Warlpiri can see what the student is supposed to do.

### **Scoring system**

The scoring system shows teachers if students need help with a particular section. The number of right responses just shows how far the student has gone through the program. The number wrong is significant. If the number wrong is high that indicates that the child probably does not understand the task and requires more teaching.

I have taught and tested the target group and done my best to see that the program is pitched at the right level and progresses at the right rate. I have tried to keep passive student time to a minimum.

### **Managing technical assistance**

As mentioned previously, technical assistance is the most expensive part of this project. At present almost all the existing grant funds have been spent, primarily on technical assistance. I always have pages of questions for the computer consultants. We only ever get through about four or five in the time I have to work with them. I have learnt to select a few most vital questions to deal with so I have things I can go on with. I have also learned not to waste so much time trying to figure out how to do things myself. I just try a few lingo alternatives and then if nothing works, leave the problem for the experts. The most urgent technical problems (those that stop the program running or responding correctly) are dealt with first.

I find that I am compromising, and leaving what I consider to be inadequacies in the program as long as it keeps running. For example, sometimes I have used many very small almost identical movies for an exercise because I do not know how to do the scripting to put it in one movie which would take up much less memory.

The next complicated thing I had to do was to make the whole program into a stand-alone projector so that the people using it don't have to have the big expensive Director program on their computer. This is a deceptively simple operation but as soon as you do it, all kinds of things change or disappear because when you play it on the computer you made it on, you can't tell when the computer is finding bits and pieces on other parts of your computer. I had to play the projector through and write down everything missing or wrong in the projector and try and track it down and fix it. I had to do this many times before everything was there and working.

I still need to create an installer so that scores can be saved on any computer. If the program is played from a CD ROM nothing can be saved. However, since I was unable to use the LATIS PC computers this was not a requirement for doing the trial. The program can be copied onto Mac computers easily and scores are saved unless children deliberately or accidentally wipe them out. Eventually I will get an installer which will prevent this.



## SECTION G

### 22. Testing and trialling

#### Method

1. Test all Yuendumu students in reading. Those who can read simple unseen text independently, have already mastered the content of *Lata Kuunu*, the interactive program being trialled. These students have not been included in the sample.
2. Pretest all non-independent readers on the content of the program to be trialled.
3. On the basis of performance on the pretests, match children in each class and assign children to the Test or the Control Group.
4. Trial the program *Lata Kuunu* with the Test group.
5. Post test children in both the Test and the Control group
6. Compare the post test results of the two groups.

#### Testing the students in Reading

This testing was carried out mainly by the Warlpiri teachers and Assistant teachers in each class. I chose a Warlpiri book called “Marlu-patu-kurlu” because there are not many copies of this book and most children would not have read it before. It is a simple story, not repetitious and not so predictable that children could guess every word but predictable enough that non-readers will get some words from context and not be too discouraged. Teachers were asked to mark a checklist for each child.

The points on the checklist were as follows:

- 1. Needs help with every word
- 2. Uses picture and meaning clues
- 3. Reads sightwords
- 4. Tries to work out words
- 5. Reads haltingly

- 6. Reads fluently

Students were given a rating from 1 to 6.

Warlpiri teachers and myself completed this task with all children present in school in August and September. For results of this testing see Appendix B.

Children who read fluently or haltingly were not included in either the test or control group as they already have phonics skills. Most students still did the pre-tests and post-tests as these were administered as a class exercise.

### **Pre-testing children before the trials**

The five pre-tests were done during August and September. They were initially administered by the Warlpiri teachers to all students present at the time. Because different students were present for different tests, I then asked children who had missed out on one or more tests to sit down in a corner of the classroom with a Warlpiri teacher or assistant teacher or myself and do the tests they had missed. Unfortunately some were not present in October to finish all the tests. This mopping up was very time consuming. It also means that some students received a lot more personal instruction and help than others. Even during the group testing some students were given extra help. Some were helped so much that the tests give little or no true indication of the child's ability to do the task. However since few students were helped with every test, if the *Lata kuunu* program is effective in imparting phonics understandings I thought it should still be evident in the difference in one or more pre and post tests.

The practice of testing students to see what they can do by themselves is very foreign to Warlpiri culture. Warlpiri people are very firmly focussed on the present and if it is obvious that what a child needs now is lots of help, then that tends to take priority over future concerns. I did explain to the teachers what they could do to help students (such

as pronounce words slowly, broken into syllables, emphasise the last sound, get them to watch the teacher's mouth) but urged them not to actually show or tell the student exactly what to write. Still I would often find teachers showing children exactly which letter to write. Then they would look guilty or as if they had just momentarily forgotten what I'd said, or give me a very good reason why a particular child needed special help. I also found myself guilty of over helping students. Some children are experts at enlisting teacher help. They simply won't put a mark on the page without approval. They point to a letter or word around the classroom or say a word which might begin with the letter or trace the letter with their finger on the desk. If they are right and you say, "I can't tell you" or even just say the sound or word again, they think they have got it wrong and continue guessing. If they do have it wrong and you don't respond they know they are wrong and keep guessing. They seem to know that teachers are unlikely to lie about letters. Some are also most unwilling to leave a space on their test. The only thing I found that worked with some children was to say, "*Yirraka*" (Write/put it).

### **Content of the Pre and Post tests**

The tests to be used in pre and post testing of students, actually test more than the computer program so far, is expected to teach. So far the program teaches only "a" and "i" but since children learn the three vowels ("a", "i", and "u") in class, they know "u" and can do the same exercises including "u" if they have mastered the skill of saying words to themselves syllable by syllable and hearing the order of vowel sounds in the words.

### **TEST 1 — 'Reading faces' (see Appendix D pages 6 to 13)**

This test page consisted of nine pictures of children's faces (taken from the computer program) each with the mouth in the distinctive shape made as one of the three vowel

sounds is produced. There was a space below each face for the children to write the letter. Teachers were instructed to demonstrate the different mouth shapes and get the class to identify the sound being formed with no voice. Teachers could write the three vowels on the board or on the top of the students' test sheets for children to copy after picking the right one. As the previous test tested if they could recall the letter shape, the purpose of this test was to determine if they could "see" the sound in the mouth shape and associate this with a letter shape. There were five versions of this test, identical in all ways except with different children's faces making different vowel sound shapes. Teachers were instructed to make sure children sitting close to each other had different tests, to make it harder for children to copy each other.

### **TESTS 2 & 3 — Letter dictation** (See appendix D pages 1 to 5 )

In classes 3/4 and up this was given before the faces test to see if students knew the letters before any testing. This is the only test which was administered entirely individually. It would have been impossible to prevent children copying and helping each other if it was given as a whole class exercise. The letters “j”, “k” and “m” were included along with “a”, “i” and “u” as having just the three vowels would have made the test too predictable. Also having the consonants there next to the vowels, gave us the opportunity to test if children could blend the sounds to read syllables. As so very few children could read syllables either before or after the trial, I have not made a table showing these results.

The tests were done in the classrooms, which have many charts with words and pictures on the walls. Teachers were instructed that children could use these to find the letters but not to show children the right letter or show exactly where to find it.

### **TEST 3 — Identifying and writing in the final vowel in words.** (See appendix D )

This test consists of a sheet with nine pictures and words beneath, where students fill in the missing final sounds. Again there are several versions of the test. The test sheets are identical in every way except with different vocabulary so children can not copy from each other so easily. Teachers were given another enlarged version of the test to use for demonstration and instructed to say each word freezing on the final vowel mouth shape. Early childhood teachers are used to this activity. Some upper primary teachers had never done this before but understood and performed the demonstration very well. Teachers were informed they could tell students the words and could demonstrate any words children asked about, freezing on the final mouth shape. The

letters “a”, “i” and “u” could be written on the board or on the student’s papers. Even if a student could say the right final sound, teachers were asked not to show children which letter to write and not to let children point and guess till they got the right one. The vowels are usually written in the same order, “a”, “i”, “u”. Many children begin remembering them by their position. Since these children are very good at remembering position and not so strong in remembering shapes it is a good way to begin. The important first concept they need to learn is that sounds have a symbol to represent them and the same sound is always represented by the same symbol. Putting the letters in different orders may interfere with this understanding as it may appear to the child focussed on position that the same sound is represented differently on different occasions. I noticed that in the 5/6 class the vowels were not put on the board in this order but placed randomly, as the teacher had picked different children to write each one on the board. By Year 5/6 the order shouldn’t matter at all.

**Test 4 — Identifying and writing the vowel in the first syllable of word.** (See appendix D pages 21 to 26)

This test consists of a sheet of nine pictures with a box beneath with the first consonant of the word and a space for the vowel in the first syllable. Again there are several versions of the test identical in every way except with different vocabulary. Teachers were given an enlarged version of the test to use for demonstration and instructed to say each word, then say it broken into syllables and then ask the class “How does the word start?” (*Nyiya-ngurlu ka wangkami?*) When the first sound was identified the teacher was to say the syllable freezing on the vowel mouth shape. Again the teachers were given an enlarged version of the test to use for demonstration. The vowels could be written on the board or on students test sheets if they needed this, with the same proviso, that teachers didn’t show children which letter to write or allow the letters to be

used for a guessing game. Teachers could help children by saying the word, oral breaking of the word into syllables by and asking what was the first sound. They were asked not to give the syllable as part of the purpose of the test was to see if children could identify the first sound. However children who could not give the first syllable (many could only give a letter) usually were told the first syllable. It often didn't help them put in the right vowel.

### **TEST 5 — Filling in all the vowels in words.** (See appendix D pages 27 to 30)

This test has nine pictures with words beneath, with spaces for missing vowels where students fill in the missing letters. Again there are several versions of the test and teachers were given an enlarged version of the test to use for demonstration. They were instructed to say each word syllable by syllable asking the class after each syllable which letter to fill in. Teachers could help individual children by writing the vowels on the top of their paper, saying a word for them and breaking the word into syllables. Children were encouraged to say the word to themselves syllable by syllable.

### **Comments on the Pre-testing**

#### Test 1 — Faces test

Most children liked the faces test even though some in the T/1/2 class just scribbled on the faces or did little writing like scribbles beneath. Some were quite able to read the faces but kept forgetting which letter was which. This class did this pretest a number of times. The teachers and I agreed that children who could learn to do this test, though not necessarily get them all right, would be ready to do the computer program.

In every class children found the “u” face the easiest to identify. Although it is quite awkward saying “i” with your mouth wide open, many children wrote “i” beneath faces saying “a”.

On one version of the faces test, the first face says “a”, the second face says “i” and the third face says “a” again. Many children wrote “u” for this third face because they are so used to the “a i u” sequence.

Some of the face pictures can be read in two ways. For example there is an “i” face which could be seen to be saying “u”. This was counted as correct for both “i” and “u” but not “a”.

#### Test 2 & 3 —Letter dictation and reading back the letters

Many T/1/2 children simply wouldn’t try to write anything on the letter test.

Many children wrote letters from the English orthography, eg. “e or “E”” instead of “i” and “r” or “R” instead of “a”. Teachers would then ask if they could write the Warlpiri “i” and say the usual “a i u” sequence as a reminder. Some would then write the Warlpiri vowel but others could not. Some children could remember two of the vowels and would then be able to fill in the one they had missed.

There were many children, in every class including the T/1/2 class, who could quite quickly and accurately find given letters around the classroom and write them but were unable to read them back. It didn’t occur to them to reverse the process and find the letter at the beginning of a known word again. Throughout the school students have been encouraged to use this strategy of finding words and letters for writing only.



While working as teacher-linguist I tested children on their ability to read and write letters. I found one student who could write every letter correctly, syllables and some words but was unable to read any of them back, even immediately after writing them. Dehaene (2003) describes a condition he calls “pure alexia”, caused by damage to a tiny region on the left side of the brain he calls the “visual word-form region”. Patients with this condition remain able to write words but are unable to read them back. He says, “they may be able, with some difficulty, to decipher the word letter by letter, often having to trace them with a finger”. This is what the Yuendumu student attempted to do but with little success. This student, to my knowledge has no brain damage. I think she has just not developed that region of the brain because the skill of writing letters and spelling has been developed in isolation from any other literacy activity. Growing up in a non-literate society, children have no over-all picture of what literacy is, so each separate school activity can be seen as a complete skill in its own right. The Western teaching practice of breaking a skill or learning into small units to practice is quite foreign to Warlpiri culture.

#### Test 4 — Final Sound in words

Most children had little difficulty identifying the final sound in words once they learned to freeze on the final sound. Warlpiri teachers were very good at teaching this. If children couldn't remember the letters “a i u” teachers could write the letters on the child's test paper. If children could correctly say the final vowel sound, teachers generally helped children by reading “a i u” at the top of their page, on the board or on a letter chart. Some teachers allowed children to point to the letter before writing. Many children were able to get every word right on this test. This made this pretest not so useful as a measure of student learning through the computer trial. However, it did

give the students confidence with this sort of testing and they were quite willing and eager to do the following tests.

#### Test 5 — Writing the vowel in the first syllable of a word.

This test was not administered in the T/1/2 class as we tried it with the most able students and they were not able to understand what was required. Even if the teacher gave the first syllable the children were so focussed on the picture and the whole word that they would repeat it eg. “ra –rampaku” and proceed to write “u” which is the last sound. Some children in the 3/4 class also kept writing final sounds. In an effort to deal with this, in the 5/6 class this syllable test was given before the final sound test. This caused some of the least competent 5/6 students to become fixated on the first syllable put the first vowel on the end of the word. Results show that the 5/6 class did not perform as well as other classes on the final sound test.

#### Test 6 — Filling in all vowels in words

The tests themselves were a learning activity. Some children who, to begin with, had little idea of how to work out the vowel sounds in words, became proficient at this by the last pre-test. Some Control group children became proficient by the last post-test. Some who had difficulty identifying the vowel in the first syllable were able to write in every vowel in this last test. Others who had completed the final sound test correctly, couldn't bring this knowledge to the task of filling in all vowel sounds and often got final sounds wrong when faced with this more complex task.

In all word tests I purposely included some words with the same vowel in the first and last syllables, lest children should internalise an incorrect rule; for example, if the first sound is “a” then the last sound will not be ‘a’. However many children still seemed to

believe that test items next to each other would not have the same answer and that there would not be two same vowels next to each other in words. Some simply filled in the next space differently in spite of saying the correct same sound to themselves. Others would stop and demand teacher confirmation that indeed it was *yangka-piya* ('like the last one').

Some children persisted in writing the letter "e" for the "i" sound. One child wrote the first sound in *jintilyka* 'grass hopper' as G.

### **Allocation of students to the Control and Test groups**

The plan was to use the pre-test and score on the reading test as points of comparison when matching children to allocate them to the control and test groups.

In the T/1/2 class there were four children who were unable to do any tests as they could only scribble, leaving 19 children. In this class there were four children, two boys and two girls who were obviously ahead of the rest in phonics understandings. I put one of each in the Test group (much to the disappointment of the other two). None of the children could read at all. They just made up stories to go with the pictures. The rest of the test group was comprised of half of the remaining children, some who scored 9 on the faces test and some with low scores. The Test group included two Transition children, a boy and a girl. Unfortunately the girl disappeared from the community just before completing the trial. Seven children began the trial but two didn't attend enough to finish it.

In the 3/4 class four girls were excluded from the sample because they already read fluently using phonics skills. Three more students were excluded because their first language is not Warlpiri. The remaining 24 were the potential sample. Nine of these

trialled the program but only eight were present for the post testing. Unfortunately many of the potential Control group students also disappeared out of the community leaving only six in the Control group.

In the 5/6 class nine students were already readers and two were non-Warlpiri first language speakers. The remaining 21 students could make up the sample. Eight of the 5/6 students attend a remedial class in the first half of the morning. I selected four of these for the test group. This class had five girls from August to October. Two participated in the trial but only one was present for the post testing and no others were present for Control group post testing. The final 5/6 Test group consisted of 5 boys and 1 girl. There were only 5 Control group students present to complete the post tests.

In the Senior girls class most students are readers. There were five girls who are poor readers. The assistant teacher was very keen for these to be included in the trial program. I selected two but one disappeared early on during the trial so I selected another one. Only two Control group students were present for post testing.

In the Senior males class there were 6 non-readers when we did the pre-tests. I started the trial with two of them but only one was at school to finish it and do the post test and no other non-readers were attending to do the post tests for the control group.

As I was running out of time for the trials and could use only two computers I selected children present on the day for the Test Group from the list of names of children who were included in the sample. I saved a few regular attenders for the control group and took less than half the sample to save enough for the Control group. The Test group children were the first ones who happened to be present at the beginning of the trial. I

thought that this would not bias the test group in favour of regular attenders, as from the 3/4 class up it seemed that the regular attenders were the readers and all the rest were erratic attenders. However, the groups proved to be not equal as the Test groups' pre-test scores are higher than the Control groups' scores on most tests. Attendance records for the Test and Control group students can be seen in appendix E.

Twenty-seven children from all classes comprise the final sample, 15 in the Test groups and 12 in the Control groups. Not all were present for all tests.

### **The Program Trial**

To trial the *Lata-kuunu* computer program I had hoped that children would work through the program in their normal computer sessions. However I was informed that the school must get special approval to put any program on the LATIS computers. Also at that time these computers in Yuendumu school did not have a sound card. The teacher assigned to the maintenance of these computers had a very heavy workload and said he could not deal with these problems for at least six weeks. I then tried to set up some of the old Mac computers which were working well before the LATIS system implementers from Darwin replaced them and piled them up in the corner of a classroom. I found the old LC Macs all still working but they would not run this *Lata Kuunu* program as it is too new. The four PowerMacs would have run it but they had all been opened up and their memory cards removed. So the trial has been done using my own laptop computer and a G3 Mac. It has been slower with only two students at a time able to trial the program but I have been able to supervise more closely and see exactly where problems are and what children enjoy and find easy or too difficult.

While children were trialling the program I made notes on the following:

- Was the program working properly?
- Did it hold the children's interest?
- Could children understand and follow instructions?
- Were the exercises too long or too difficult?
- How much supervision was needed?
- Were children guessing or paying attention to the sounds?

The children's scores were saved on the computer. Some examples of these are included as Appendix F. They show only what the student was able to do in their most recent attempt at the exercise, as most exercises have a command in the script that sends the student back to the beginning instruction and examples and resets the score, if they give a certain number of wrong responses. However, one Year one child managed to get a wrong score of 46 on an exercise where I had failed to put in the reset score command. Another 5 year old found he could get many ticks if he pressed the mouse many times very quickly before the play cursor moved on.

The biggest problem I have had is with attendance. Some students that began the trial left the community and did not return this year. Others finished the trial but were not here for the post-test. Other students turned up who hadn't done the pre-tests or had done only some of the pre-tests. Many are just erratic attenders. I had to work with the children who were present or the trial would not have been completed. I would go to the classes day after day to see which children were present, who had begun the trial or were part of the sample.

**Notes on the Trial of the program *Lata Kuunu***

### **The Setting**

Because the Post Primary girls' class teachers were initially the most interested, I asked if I could set up the G3 computer in a little room adjoining their classroom and the cooking room. They agreed and the literate girls who were not part of the sample were free to use the program in the afternoons. One went right through the program. The Test group girls could also work on the program in their own time. I used my own laptop G4 in the cooking room, which was only used for cooking some afternoons and for making school lunches in the mornings. The young woman who does school lunches was very interested in the program and often helped children if I was busy with the other child or out looking for the next children.

We didn't have head phones so it was good having the two rooms so that the sound from the two computers did not interfere with each other. The child in the little room could see the other child if they just peered round the corner. Between 8:15 and 9:00 the cooking room is used for the breakfast program. Children who want to, can make themselves toast and tea or have wheatbix. This was a good chance for me to catch Test group children, get them started and other children could watch for a little while, luckily not too long as they could not resist telling the Test group child which key to press.

All the children were very keen to "do computer". As soon as I entered a classroom they would start clamoring to be chosen. This was often very disruptive for the class and the teacher so I had to quickly see who was present and choose someone from the sample group without delay. One Test group child in 5/6 actually started crying because he was not the first one chosen that day. I felt very bad about saving some children for the Control group. I could explain to the older ones that after the first group were

finished and all the tests were done again they could have a turn. In the last two weeks of school I put a computer in the T/1/2 class and asked an assistant teacher and one mother to help children with it. Some got help. Others didn't. I took two very keen 3/4 girls to the cooking room to do the program on a few occasions but they didn't get to finish the program. Next year I plan to make sure all those children who missed out do get a fair turn.

### Was the program working properly?

Every day after the trials I came home with long lists of things that needed fixing. Mostly they were small things; for example, there were many places where the child could type too early before the script was reached that caused the response to the keyboard action. In some places there was too much instruction. In other places there was not enough. Almost every night I worked through all the things to be fixed and next day there would be more. Sometimes things that had been working perfectly, would suddenly stop working. For example the back button stopped working on the G3 computer. There are still some things I can't fix but nothing that prevents children using the program. (For example; the random play instruction is causing flashes between movies as some movies start for a fraction of a second and then get put at the end of the sequence.)

I did find that more navigation tools were needed, as the siren would often go when children were halfway through a menu item, each of which is comprised of two sections. The only way to get to the second section was to replay the first section. I also needed to get to the reward games for children who were just up to one of these. My original idea was to prevent children getting to the games without doing the previous



exercises. I thought I had hidden the new navigation buttons away in the information-for-teachers button but some children still found them even though none of them can read.

#### Does the program hold children's interest?

The program does hold children's interest. It was designed with young children in mind but older students right up to post primary have been totally involved in completing the exercises, remaining very focussed and not distracted by other children or people coming and going. Originally I planned to trial the program with Primary children only, but at teachers' requests, two senior girls and two young men were included in the trial. I have found that these older students will work at the program until the siren goes for recess or lunch or home-time and some keep going after the siren. One worked at it for nearly two hours without a break. One completed all the exercises teaching letter "a" in one go. Some year 5/6 students have done more than half the exercises for one letter in one sitting. The year T/1/2 students usually lost concentration after about four exercises, that is, after about half an hour. However, some very young children just wanted to keep going indefinitely or until the siren goes. When I finished post-testing I left the computers in the Senior girls class and the T/1/2 class for other children in the control group who had been constantly begging me to choose them for computer. I started them off, just getting them to type in their names and start the first exercise and left them to do it by themselves. One six-year-old boy started at 9:15 and when the siren went at 11:00 he was still going. He hadn't got through many exercises as he must have had to repeat many but he had kept going. Another time I looked in, another control group child was using the program unsupervised and there were about ten other children all around her, watching, talking, pushing shoving each other to get closer.

This child just kept going, working through the program saying the words to herself. I find that children who say or mouth the words are much more successful in doing these exercises.

Some children are very quiet and serious as they work. Others talk a lot, make little dialogues about the animations, copy the sound effects, constantly touch the screen, follow movement, pretend to pick and eat bush bananas, for example. Some count everything. I had planned to put in some children's voices to bring the animations to life a bit more, but seeing children doing this themselves I have decided against this. I feel the value of the opportunity for those inventive children who do this, out-weighs the possible added interest value for those who don't.

Some children like to zoom the mouse around the whole time. They are learning to control the mouse. I had thought of hiding the cursor for the typing activities but it doesn't seem to interfere with children's performance. They like doing two things at once.

I had thought that the same animations might get a bit boring when repeated in the different exercises so I shortened some of them. However one child seemed quite disappointed when the kangaroo did not hop awkwardly across the screen again as it had done the two previous times. She was hopping her hand along where it should have gone.

There are differences between boys and girls in the things they laugh at or comment on and the exercises they prefer. Many boys laugh at the arm muscle popping up and down

and comment on the shield blocking the spear. More boys copied the sound effects though a few girls did this too. A few girls copied the baby talk in one of the word animations. One remembered this utterance and said it before the baby on the next occasion. Only girls asked who was the baby whose voice was on the computer. The greatest difference was in reward game preferences. The boys liked the shooting game and often played it again. Girls often gave up on this game. Two girls played for about 5 seconds and didn't want to play any more. Boys liked shooting balloons with "a" on them and only older boys replayed repeatedly on the fast speed until they got 10 right and 0 wrong. Girls liked catching the softballs with "i" on them just as much as the boys. Some young children got sick of the softball. The girls' favourite game was the memory game at the end which they all wanted to play again. There was no noticeable difference in how quickly boys and girls mastered the exercises. There were fast and slow learners of both sexes and in every age group.

Some older children, realizing there are random sequences, played a guessing game, predicting before the word had been said, whether it would have "a" in it for example. When they were right they would say, "Yes!", in English, in the way that teenagers use this expression when they get a goal or win something.

Many children were initially quite anxious when they got crosses. Some hide their faces, cover their mouth or eyes or look away, or wince, or suddenly draw in a loud breath, or say "*Wara!*" (an expression of shock) or "*Yakarra!*" (literally 'Wake up!' but often used as 'Oh No!' or 'Oh dear!'). When I told one boy he was doing very well he pointed at the one cross and said very seriously, "One mistake". The post Primary girls learned how to wipe out their scores by jumping to the exercise (which resets the

score to zero) and jumping straight back to the menu. I got them to redo some exercises. They didn't mind. They mainly just didn't like a high cross score next to their name. A few adults I have mentioned this to, have suggested using some other way of giving feedback. I think the children need to get used to making mistakes and realize it doesn't matter. I think learning by trial and error is an essential part of learning Western skills such as literacy, Maths and computer skills. Children in Year 3 and up are very motivated to try not to get crosses. Many rejoice when they get 10 ticks and finish an exercise. Some say "I'm winner".

The very young children don't mind getting crosses. Some are more interested in clicking every letter and every face to see what they say. Maybe they are trying to recognise the voices. Some copy every sound. This makes me realise I should have the letter sounds on every letter rather than just the teachers voice saying "*lawa* 'a'-*wangu*" 'No, that's not "a"'.

Perhaps the very young children need a different kind of program where they just click every thing and copy every sound and utterance. Perhaps the "*Reading Freedom I*" task of just clicking on words and hearing them spoken is not so boring for young children. Perhaps they have a different kind of memory for learning language. They just repeat everything and remember a large amount of language.

### Can children follow the instructions?

Most children seem quite able to follow the instructions though there are a few particular places in the program where children often ask for help or start trying every key or clicking everywhere. I need to record more sound to improve these directions and provide more examples. Very young children need a lot more help than older students. Some little children repeat whole lengthy instructions to the best of their ability and I think it may not be very meaningful to them. They may be still at the echoing stage of learning to talk. With a little demonstration they quickly learn the pattern of what to do. Some older students seem to ignore the instructions; for example they keep trying to use the keyboard when the instruction was to use the mouse, or keep trying to type the whole word when asked to type only “a”, if the word has an “a” sound in it.

### Are the exercises too long or too difficult?

No exercises are too long as children rarely stop in the middle of them. Many children get one or two wrong at the start and then they learn how to get them right. Some exercises are too difficult especially for the younger children. There is an exercise with pictures popping on the screen which they have to click only if the word has “a” in it. I have slowed it down so that the pictures wait two seconds, which is too slow for older children but still too fast for the young ones. They need unlimited time to say the words to themselves a number of times. I can’t fix this myself.

There is another exercise where they have to choose the picture which starts with a given syllable. This is also too hard for the younger children. Some extra steps and

demonstrations are needed. For some younger children it is a big step from typing the vowel in one syllable (they have no trouble with this) to typing in all the vowels in a word. I did originally plan to have an intermediate exercise but left it out due to time constraints.

Young children and some older children find the exercise where they have to type ‘a’, space, ‘i’, space, ‘a’, space, in a continuing pattern too difficult. I have to help them or let them jump over this exercise. I have decided to leave out this exercise. I need to make an easier exercise where they just type; “a”, space, ‘a’, space, in a continuing pattern. I think it is helpful for literacy learning to be able to recognise patterns.

The exercises where children have to type the number of “a”s or “i”s they hear, are virtually impossible to get wrong, because as soon as the right number have been typed, the script does the tick and moves the program along. If not enough “a”s have been typed, nothing happens and the cursor continues to flash. I have been unable to fix this, but after watching children do the exercises I have decided to leave it as it is. It would probably be too difficult for many children otherwise. As it is, it is a good listening and watching activity. Children listen and as they type they see how many “a”s are in the word. They get them all right (unless they press a different key). As many are repeating the word to themselves and pressing the “a” key the right number of times by the end of the exercise it is still useful. I knew some children realized they had pressed too many times because of their reaction when the program moved on while they were still trying to type. They were relieved they didn’t get a cross.

### How much supervision is needed?

All students need some supervision. Most need to be shown the first time how to type in their name and how to find it on the next occasion and to see their scores and go to the exercise they were up to. Even the youngest ones learn to find their names very proficiently. Some children call for help often. Some never do; they just keep trying different things. Sometimes I find they have jumped to a later or previous exercise or they have found how to get to the reward games.

The youngest children keep looking at me to share a smile at the animation or make a comment or seek approval for a response. They are not interacting just with the computer as older children do. The young children probably need a supervisor for every two children. Year 3/5 children would probably need a supervisor for every 5 or six children working on their own computers. By year 5/6 they need very little help and one adult could supervise a class of up to about 16 each working on their own computer.

### Were children guessing or paying attention to the sounds?

Most children were watching the mouth and paying attention to the sounds. Most were saying or mouthing the words themselves as they worked through the exercises.

However some children did not work out that they could get the tests right by watching the mouth, even though the spoken instructions repeatedly tell them to do this. I had to point it out to some children a number of times. A few I think were guessing for some exercises and would not have got through these exercises so quickly without help.

Without help they would have made many mistakes and would have had to repeat exercises many times. I don't know if they would have eventually learnt this way but I felt they really needed extra face to face teaching. It is hard to tell what is going on in the minds of the children who don't say the words themselves. They may be trying

other strategies or they may be guessing. Where there are only three options they could be expected to be right a third of the time. However some children seem to be wrong most of the time, which indicates they are using some system which doesn't work (typing the last vowel sound instead the first for example).

Some children would be working well, watching the mouth and getting most right by the end of a session, but the next time they came they had forgotten again and had to learn again. There are three Test group children who are still at this stage.

### **Post-testing**

As with the pre-tests, all but the letter dictation test were done as a class activity using test sheets. Children were asked which version of the test they had done before and asked to choose a different one. Most could remember which one they had done and happily selected a different one. They then had to sit away from another child with the same test sheet. As before, children who were not present for the class test, did the test on another day individually.

There was much less instruction given for the post-tests. Teachers expected that children would know how to do these tests now. Most did but some didn't and gave up after the first few words. Some then did the test later with more help.

There is one important difference between the computer exercises and the tests; that is. to complete the hard copy tests children have to write the letters with a pencil rather than just find them on the keyboard. This proves difficult for the youngest children who are unused to copying these letters unless they happen to occur in their names.



The computer program teaches only “a” and “i” at this stage but as there is only one other vowel, children have in fact been learning this “other one” by pressing the space bar when the vowel sound is not “a” or “i”. They learn “u” by default. In all computer exercises children can type the correct letter rather than the spacebar if they choose. Many students discover this and prefer to type “u” when the sound is “u”. I found on the post-tests that some young Test group children were confusing “a” and “i” but not “u”. They know they learnt “a” and “i” on the computer but forget which was which. They know “u” is the other one or the one they “found” by themselves.

One young girl who began the trial seemed unable to do the exercises until she came to the ones where she had just two choices, type “a” or the spacebar. Then she began getting most of them right, even though the task of hearing and watching if a word contains “a” is more complex than just pointing to the face saying “a” or finding all the letter “a”s. I was planning to make “u” the next letter in the program, but perhaps it would be better to teach “m” and blending with just “a” and “i” to begin with to keep the choices down to two.

After working through the *Lata-kuunu*, most Test group children could fill in the vowels quite quickly. There are only three of the Test group that haven’t thoroughly grasped how to work out vowel sounds in words. Some who do know how to say the word syllable by syllable to themselves, make a mistake on the last test because they see the first letter as the first syllable. They then say the second syllable and write this vowel in the first space. When they get to the end of saying the word there is still a space but they usually just say the word again and write in the last sound.



## SECTION H — Results

### 23. Comparing pre and post-trial test results

For most tests there are small differences in the difference between Test group and Control group mean scores on pre and post-tests. However the sample is so small and the differences are so small that there is no point checking the probability of these scores occurring by chance.

In a few cases the difference between pre and post-test scores is actually greater for the Control group than for the Test group. It is a small difference in each case and is what I would see as the normal degree of variation expected on these tests (that is, the same child is likely to get slightly different scores on each different version of the test and even on the same test depending on teacher help, distractions, presence of letter charts, ongoing class instruction etc.)

The only test where the difference between Test group and Control group performance on pre and post-tests could be reaching statistical significance is the last test, filling in all vowel sounds in words. Combining Test groups and Control groups from all classes gives a Test group of 15 students and a Control group of 11 students. The mean scores for the Test Group are 4.5 on the pre-test and 8.2 on the post-test. The mean scores for the Control group are 3.7 on the pre-test and 3.4 on the post test. (See appendix C, page VII). The Control group's slightly lower score on the post-test is small enough to be normal variation. It could also be due to the fact that students received much less instruction before completing the post-test. Also the sample is so small that one child not focussed on the task can bring down the mean dramatically. Means can be

deceptive. Sometimes it is more useful just to look at individual results. There you see that 6 out of 8 children in 3/4 class and 5 out of 6 children in the 5/6 class got 9 out of 9 correct, every vowel in every word correct (21 – 24 vowels). In the 3/4 class, no children could do this on the pre-test and in 5/6 only 2 could (after doing all the other tests). Two T/1/2 Test Group children also got them all right. They did not do this pre-test before the trial because they were not able to go any further with the tests.

There is a slightly greater improvement in the combined Test group's post-test scores on the fifth test, writing the vowel in the first syllable. (See Appendix B, page IX ). The Test group's mean pre-test score is 5.6 and post-test mean score is 8.3. The Control group also shows an improvement, from a mean score of 4.8 on the pre-test to 6.3 on the post-test. The difference in the Test group's mean pre and post-test scores is slightly greater but not significantly greater for such a small sample.

The letter dictation and reading back the letters scores show that most Test group children get all three vowels right on the post-test even though the program only taught two of them specifically. The Control group's post-test scores were also slightly higher but less than half of them could write all three vowels. However, their pre-test scores were lower to start with. (See Appendix B, page II)

Reading back the letters would seem to be easy as the child has just written them. T/1/2 children did improve in reading back the letters. In other classes the Control group's reading back score is less than their writing score. (See Appendix B, pages II and III). This is because they write the letters by finding them on the wall chart or desk letters in the familiar "a i u" position. They then can't read them or misread them in another

position. Most Test group children don't need to look at the wall charts as they remember the letters. Some T/1/2 children just needed to copy "u".

### **Report Summary**

Overall the results show little difference between the Test group and the Control group's improvement on the post-tests. The main reason this is that for the pre-tests every effort was made to help children get every test item right. Mistakes could only occur with whole class administration, as teachers could not help all children at once. Also when I was present for individual testing I was a bit more stringent about not letting children guess till they got the right answer. With other teachers supervising individual testing, children could only make mistakes if they thought they were right and wrote the letter quickly before the teacher could make them think again.

The last test, writing in all vowel sounds, where Test Group children's improvement was noticeably greater than the Control group's, is perhaps the most important test in that it demands the skill later required to write whole words. This was also the most demanding test, requiring greater concentration and a greater number of responses.

What the figures don't show is the ease with which most Test group children now do these tests. They don't need to look at the letters. They don't need the teacher to say the word for them and break it up into syllables. I realise now that I should have timed children on their post-tests and noted how much teacher help they needed.

## SECTION I

### 24. Conclusion

One firm conclusion from my experience on this project is that constructing an interactive learning program is far more time-consuming and expensive than one could imagine, and is therefore not to be recommended as a project for working teachers.

This time and cost factor may explain the poor quality of programs reviewed such as *Reading Freedom 1*. However if teachers can get release time or grants to do projects like this one, I suggest it is more useful to have teachers designing and making programs than to leave the job to computer experts who have little understanding of the educational needs of children or useful teaching strategies.

Teaching children in their first language in Aboriginal language speaking communities is to be recommended and this is borne out by the Literature Review, together with personal experience and anecdotal evidence in this report. I feel sure that many of the older non-reading students responded well to *Lata-kuunu* because the instructions and the exercises were in Warlpiri. Some of these students are very reluctant to participate in class literacy lessons. The younger children could not have done a similar program in English.

The importance of phonics for the acquisition of literacy is now recognized. Successful strategies for learning phonics in Warlpiri speaking schools have been documented in this report. These are being re-introduced into the local school curricula and can be reinforced with the *Lata-kuunu* program.

In spite of the availability of only two computers, the trial went well and was extremely useful in revealing the usefulness or short comings of the various exercises. It gave me

an insight into the readiness and abilities and interests of the various age groups. The children enjoyed it and it was rewarding for me to see their reactions to all the little animations I had labored over.

The trial was the best possible way of testing the program for bugs, as it is possible to observe two computers quite closely and still leaves children with some unsupervised time to do unusual things. It was productive doing it day after day over seven weeks, as fixing one problem often causes something else to go wrong, often little things that an adult, knowing what you are supposed to do, doesn't notice when playing through the program.

Although the results of the testing program with the Test group and the Control group have not provided conclusive evidence of the usefulness of the *Lata-kuunu* interactive computer program, I feel certain that the testing and the trial of the program together have greatly improved children's knowledge of the Warlpiri vowels.

The main reason there was so little difference in the Test group's pre and post-test scores was that children had so much teacher help with the tests. This could only have been avoided if I had completely taken over the testing myself and conducted it in a way quite foreign to these children and possibly damaging to their confidence in their own ability to learn letters. It would be unethical in a Warlpiri school with Warlpiri teachers to leave them out of a project involving their own language and use their children in a way which would further my own ends. Warlpiri teachers have benefited from their involvement in the testing. They have a more insightful knowledge of the skills and needs of their students in this specific area and they have learned some useful teaching strategies.

There are other faults in the design of the testing program. It should have been done over a longer time period so that the Test group and Control group could have been more carefully matched and a bigger sample could have been obtained.

In spite of the failings of the testing program and the small amount of content of the computer program completed in this time allocation, I hope this report contains material which will be useful to others embarking on similar projects and to teachers of Aboriginal children.

I feel certain that it is worth continuing with the development of this computer program, *Lata-kuunu*. I hope to apply and receive some funding so that others at Warlpiri Media Association can work on this project. They have expressed interest in this and have submitted some grant applications. Unfortunately one has been rejected by ATSIC. Their refusal letter stated, “Bilingual Education doesn’t work.”

The next section of the computer program, *Lata-kuunu*, to work on, will be to teach a consonant, and introduce blending with “a” and “i”. Since all children except some of the youngest ones knew “u” as well as the other two vowels by the end of the trial, there is no urgency to teach it. It can remain as “the other one” for the next section. As so few of these non-reading children could read syllables this is an obvious priority. The letter “m” is a suitable letter for introducing blending as it is a continuous sound and blends smoothly, unlike the stops such as “j” “k” “p” etc. The letter “m” occurs frequently in Warlpiri words.



The next priority for me, is to continue the trial of the program with the Control group children and test both groups again after the Control group complete the program. I will be interested to see if Test group children retain their knowledge over a longer time period.

I am very grateful to everyone who has supported this project. Their names are listed in the credits which can be found by pressing the blue information button on the menu of the computer program, *Lata-kuunu*. A printout of this can be found on the last two pages of the separate Appendix section, in Appendix G — printout of the Introduction section of the computer program.

By Wendy Baarda

Yuendumu, NT.

December 2003

## SECTION J

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