



Public submission made to the Review to Achieve Educational Excellence in Australian Schools

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Summary

Learning by reading is critical to the success of any education system and Australian PISA rankings are likely to continue to fall if literacy rates are not improved.

We believe that Australia should adopt literacy goals that will really make a difference to the education sector if achieved. We believe that Australia should strive to equal Finland's success teaching literacy, and for reasons set out below, we believe that this is entirely possible.

Recent news reports state that the government intends to spend approximately \$300 billion dollars over 10 years to close the gap with indigenous Australia. We believe that to successfully close the gap, the literacy and vocabulary acquisition rates need to be significantly increased for children from low literacy families (including some indigenous families). For reasons set out below, we believe that this is entirely possible if quantitative experimental research to significantly improve literacy and vocabulary acquisition rates costing \$4-\$6 million is funded.

Once continuous assessment tools are added to the Readable English eReader, and when it is optimized for reading comprehension, it can become the basis of a new kind of learning platform (called the Readable English Learning Platform, RELP) that can be used for any subject taught using written materials. RELP will be designed to facilitate the optimization of both content and interface, and is designed to automate reports and other administrative tasks of teachers, increasing their productivity, reducing overload and freeing up time to spend teaching struggling students.

Main submission

Australia has an emerging literacy crisis. According to the ABS, over 40% of Australians surveyed were classified as having insufficient literacy for 'coping with the demands of modern life and work'

(<http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/4228.0Main+Features202011->

12). Moreover, PISA rankings are actually falling – since 2000, PISA results show reading literacy rates have actually fallen by 10 months and the 2015 PISA ranking was 12 places below the 2006 ranking.

Part of the problem is the nature of the English language. The complex spelling of English makes it a difficult language to learn to read. Words are not pronounced as they are spelled, and almost all of the decoding rules that are taught have exceptions: e.g. ‘cove’ and ‘drove’ follow the silent ‘e’ rule, but ‘love’ and ‘move’ are exceptions that need to be memorised by rote.

Seymour, Erskine and Aro (2003) conducted a cross national study of students reading abilities from different language backgrounds and concluded that “the acquisition of elementary word recognition and decoding occurs more slowly in some languages (Portuguese, French, Danish) than in the majority, and the delay is greatly exaggerated in English” (p. 165). They hypothesised that the deeper orthographies (non-phonetic languages) induce the implementation of a dual process (logographic + alphabetic) which takes more than twice as long to establish as the single process required for the learning of a shallow orthography (phonetic language, such as Finnish).

Suggested Literacy Goals

Literacy is the basis of any education system. Machine learning applications are likely to replace many lower skilled jobs in the next 5-10 years. Some commentators argue that new jobs will be created, but we are not aware of any commentators who believe that these new jobs will not require strong literacy skills. Students with poor literacy face a bleak economic and health future. Fixing literacy is now more important than ever. The costs of poor literacy to Australia are huge:

https://docs.google.com/document/d/1VRRmr6cLbXv-eXvclWGtltnmqywmvQnHK1_e-3pq1w/edit?usp=sharing

We believe that the Australian Government should set goals that are aspirational, will make a real change when achieved and will encourage educators to trial promising new teaching methods or products to reach these goals. We believe that an Australian literacy goal should be that 95% of Australian students should be able to read as well as children from Finland (see Seymour study) can read after 1 year, and that all Australian students should also be able to effectively learn by reading after 1 year.

Different Ways to Teach Reading

Learning to read is a critical step. Unlike speech, which is a ‘natural’ ability that most people develop early in life without the need for specific instruction, literacy is a skill of relatively recent development that must be specifically taught. To learn to read, several different parts of the brain need to become closely coupled. This requires

physically changing the brain. The brain is plastic, but this requires a lot of deliberative practice – repetitive practice with the intention of getting better.

Children from “good education” families are almost always read to as children. They develop a positive relationship with reading, and the 1000 Books Before School Initiative means that by the time they reach kindergarten, they have likely spent over 500-1000 hours reading or being read to. Conversely, researchers estimate that children from low socio economic families hear around 32 million fewer words than the average middle-class child in their first four years of life and some may not have seen a book. These children start off behind at school and the complexity of the English language makes it difficult to catch up.

In phonetic languages like Finnish, students can accurately and independently sound out words letter by letter because the rules for decoding are consistent and there are no exceptions to memorise.

The difficulty with English is that even with phonics based approaches, students encountering a new word cannot know if the word is phonetic, if a rule applies or if it is an exception (e.g. few, sew, crew). This makes independent reading practice difficult for students from low education families or families speaking little English, because there is no one to help the student learn the sound of new words.

Australia’s poor literacy results show that phonics does not work well for a lot of students.

Readable English is a unique and intuitive system that makes English phonetic without changing the spelling of words. A pronunciation guide is embedded into words by adding syllable breaks, greying out silent letters and adding intuitive visual cues, called glyphs that tell the reader exactly what sound a letter will make when it doesn’t make its usual sound. Readable English enables students to sound out a word character by character, without rules or exceptions.

Learning words by sounding them out phoneme by phoneme is a more efficient way to develop sight word recognition than by rote memorisation. Once a reader can recognise a word in Readable English by sight, the reader can also recognise that word in standard English because the shape and spelling of the word have not changed. Readable English markings are like training wheels on a bike – when a student learns to read a word by sight, the markings are no longer needed.

Pilots of Readable English in Australian schools have demonstrated the effectiveness of Readable English. Students in reading age twice as quickly as students in a control group, in both reading accuracy and comprehension. The significantly greater rate of improvement was observed when students were assessed reading with the phonetic cues, as well as when reading in Standard English.

<https://www.readableenglish.com/au/research-results>) Professor John Sweller of UNSW, one of the founders of Cognitive Load Theory, has written an endorsement of

Readable English and these preliminary data. “Based on theory and data, I can recommend Readable English in the strongest possible terms. It has the potential to transform the teaching of English.”

<https://www.readablenglish.com/au/portals/0/pdf/Endorsement.pdf>

Importance of Independent Reading Practice

Being able to read so that a student can understand and learn what they read is an essential skill. The goal should be the development of reading automaticity where students can devote their entire concentration on understanding the content because they do not need to concentrate on decoding the written text. This can take hundreds or even thousands of hours of practice to develop. As there are not enough hours at school for the practice required, children from low literacy families will need reading practice out of school hours. Schools should organise the support for this practice to happen.

Readable English supports independent reading practice as it enables students to sound out any word letter by letter with no rules or exceptions. The online Readable English eReader also provides additional independent reading practice support and allows teachers to remotely monitor student practice and progress. The Readable English online book store has thousands of titles and provides students with a choice of reading materials. Documents a student wishes to read can be quickly and easily converted into Readable English by the student, parent or teacher.

Teaching the 22 Glyphs

The glyphs have been made to be as easy to learn as possible. Each glyph is introduced with a 30 second video that provides a visual link between what the glyph looks like and what sound it makes (for example, $\text{\textcircled{a}}$ makes the sound /o/, like in ‘yacht’). Each glyph also has a song, a body movement and a memorable name, incorporating the sound it represents, to help students remember the sound (known as a mnemonic). Early use of Readable English suggests that younger children can learn the glyphs in 8-12 hours and some older students learn the glyphs in half that time. Compare the 22 glyphs to the 100 sightwords that students are required to learn in their first year at a NSW public school. A minimum reading vocabulary is 10,000 words. 6000 of these words are non-phonetic, and need to be learned by rote.

Student Motivation and Behaviour

Many struggling readers develop a negative self image, such as believing they are too stupid to read. When the erratic spelling of English and the simplicity of the Readable English solution is explained to them, to date all struggling readers have been motivated to try Readable English. Students score Readable English highly in feedback when they have completed their course and most students want to keep their Readable English materials.

The first Readable English pilot was done in a school in Brisbane. The students progressed quickly with their reading. After a month, the pilot teacher was asked by several teachers what she was doing with the students, as their behaviour was improving and they were participating in class. We hypothesize that as their reading skills improved, their stress levels dropped and they had more access to executive functioning.

Using Readable English in Schools

Readable English can be thought of as an extended alphabet, and can be used with any teaching method or curriculum – all that is needed is the conversion into Readable English of the learning materials used by the teacher.

The 5 Essential Reading Skills

1. Phonemic Awareness

The What's Changed? App has been specifically designed to develop phonemic awareness – the ability to discern the sounds, and the sequence of sounds, within a word. Develop phonemic awareness and you will almost certainly learn to read. Accurately discriminating the phonemes in a word improves auditory discrimination and spelling. This App was developed from face-to-face games played in reading clinics in the US shown to improve reading outcomes.

2. Phonics: Learning and using the relationships between sounds and letter-symbols to sound out (decode) written words.

As described above, Readable English makes English phonetic, allowing students to sound out even irregularly spelled words like 'tough', 'who', 'asthma', which other phonics based systems don't address.

Accurately showing the phonemes and syllables in a word helps both auditory discrimination and pronunciation. For example, have you been in a meeting when a foreigner says their name and you can't discriminate it clearly, but when you read their card you can better discriminate what they said.

Two Readable English Apps teach auditory discrimination and pronunciation:

- a. The Choose or Lose App teaches the sound of English letters, digraphs (combinations of letters like "ch"), the sounds of the glyphs, and the 1000 most common syllables and words. Playing the game improves auditory discrimination, which improves pronunciation.
- b. The Pronounce Precisely App that uses voice recognition technology to analyse a student's pronunciation at the phoneme level. It also provides detailed mouth movement instructions on how to accurately make the sound of English phonemes.

Readable English has been the subject of a 6 year research project. When we explained the science behind Readable English to teachers, we were asked numerous times to write down what we knew about the science behind reading, neuroscience and Cognitive Load Theory, as this was new to many of the teachers. These requests gave the impetus to write the book on Readable English.

<https://www.readablenglish.com/eBook-download/>

3. Fluency

Reading practice is essential for the development of reading fluency. Readable English supports independent reading practice by allowing students to

- fluency requires sightword recognition. Accurately sounding out words character by character enables students quickly to develop sightword recognition (sounding out words character by character and using the apps),
- The Choose or Lose App teaches sightword recognition for the most common 1000 words and teaches the most common syllable sounds. The 500 most common syllables make up 13,802 words, so learning the syllable sounds can appreciably increase sightword acquisition rates,
- look up the meaning and translation of words using the eReader,
- individually adjust the format of their document, so they can select the format that is easiest for them to read and
- convert documents into Readable English so they can read what they want to read.
- Parents and teachers can monitor a student's reading practice performed with the eReader.

4. Vocabulary

Students can improve their vocabulary by reading practice and students have the ability to quickly look up meaning and/or translations of words in the eReader.

Prefixes and suffixes are marked with syllable breaks, supporting the teaching of vocabulary by morphology.

5. Comprehension

Pilots show that accurate decoding of the sounds words increases reading comprehension. Reading practice improves reading comprehension and Readable English supports independent reading practice. We will be highlighting phrasal verbs and idioms which ESL students find very difficult. We read for meaning using phrases. The technology to break sentences into phrases and display sentences as phrases will be added to the eReader and to the data conversion tool.

Research

Understanding the Neuroscience

We are collaborating with Professor Karin Harman James PhD of the Psychological and Brain Sciences Unit at Indiana University. Professor James has done an fMRI (functional magnetic resonance imaging) brain scan on a student, and has found that the Readable English stimuli (letter plus glyphs) recruit the reading network more than standard English words. A research project to understand the way the brain processes Readable English words versus standard English words in being planned and should help us understand how Readable English can be best applied in a teaching environment.

Cortisol and Reading

We are collaborating with Sydney University Adjunct medical Professor Eugen Molodysky to test the hypothesis that stressed students (e.g. traumatized children in foster care) with high cortisol levels will have little capacity for executive functioning (they will likely be in flight, flight or freeze mode) and will find learning to read a non-phonetic difficult because this requires executive functioning. It is also hypothesized that learning to read a phonetic version of English (Readable English) will be considerably easier because words can be sounded out character by character with no rules or exceptions, and there is less need for executive functioning. It is also hypothesized that learning to read will reduce student stress levels. The logistics of organizing this research is complex and we are waiting on funding.

Development of advanced teaching and learning tools

The Readable English mark up is consistent and significantly reduces the machine learning required to make develop advanced reading and pronunciation assessment tools so that students and teachers can instant feedback on how well the student is reading and pronouncing words.

Working with Prof John Sweller of UNSW, we plan to create optimized teaching tools using Cognitive Load Theory.

We plan to develop new tools to promote reading comprehension. We can display text phrases by phrase and accurately classify the parts of speech in a sentence. We will research how best to display this information to improve comprehension. We will also experiment with different graphical displays to find out how best to teach grammar and the meaning of different grammatical structures using graphical displays.

Customization based on native language of the student

Spanish speakers have the same alphabet, have many common phonemes, have a number of similar grammatical rules, and there are a lot of words in Spanish that are in English. Spanish speakers do not need to learn what is common to Spanish and

English and so can be taught differently to Chinese speakers whose language has much less in common with English.

Vocabulary

Children of good education families may have vocabularies of 5,000-10,000 words when they get to school, whereas children from low education families may have vocabularies of less than 1,500 words. If low education family children are to close the gap, then they need to learn vocabulary quickly. The number of words a teacher can teach has been estimated at most 400 per year. At this rate, it will take a student 20 years to catch up with the vocabulary of a higher education child. The gap will not close.

We need a vocabulary teaching research project that will accelerate vocabulary acquisition by using advanced learning tools, testing students and teaching them what they don't know, and developing automated revision systems to make sure that the words students are taught are firmly embedded in their long term memory. This requires repetition. We will be developing a machine learning based intelligent revision system that will individually minimize the revision required for students to remember the words they have been taught.

Indigenous Literacy

We have been consulting with Warren Mundine, the former Indigenous advisor to the Federal Government. Mr Mundine thinks that Readable English will be considerably easier for indigenous students than current teaching methods and that it should be piloted in a number of schools. Extending the phoneme set by adding glyphs may enable Indigenous languages to be taught simultaneously with English.

A 9 year old, Dereck, has learning issues and has an Individual Education Plan (IEP) to help struggling students. He was taught to read over the internet using Readable English and now at 12, is a good reader, reading above his age level. His younger sister has reading issues and when the reading specialist for the younger sister found out about Dereck and Readable English, she started a pilot for 23 struggling readers, and has asked Dereck to help teach some of the students.

Mr Mundine thought that paying indigenous youth to teach other indigenous people to read, and/or to supervise their reading practice should be trialled, as this would give employment to students and encourage school attendance. An indigenous story writing competition was also discussed, as was a story illustration competition. The best stories could be published internationally in print and electronically, and would likely be popular with indigenous readers practising reading.

Recommendations

The government is reportedly planning to spend approximately \$300 billion to "close the gap" with indigenous Australia. Current literacy and vocabulary acquisition rates

will make closing the gap extremely difficult no matter how much money is spent – indigenous and low education students will take many years to develop a good vocabulary, and a good vocabulary is required for good reading comprehension. Research to improve literacy and vocabulary acquisition rates as well as comprehension and general language learning needs urgent funding. We estimate the cost of this project (including the costs of making individualized accessible editions generally available) to be between \$4.5 and \$6m.