

To what extent does computer-based immediate feedback have an effect on the Reading Aloud of Primary 3 students?

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Abstract

This paper reports on a two-year study conducted in Rivervale Primary School that explored the use of a computer-based online software, Reading Assistant, to improve the Reading Aloud of Primary 3 students. Reading Assistant is an online software by Scientific Learning Corporation, which provides individualised reading intervention. The software chooses reading passages for students based on their reading ability after a pre-test. The software also models reading passages for students and prompts comprehension questions to assess the student's understanding of the passage. After the software has modelled the reading of the passage, students then record their own reading. This reading is assessed by the software and students are given a fluency report at the end of their reading. The fluency report gives the student data on the number of words correct per minute and words that were incorrectly pronounced in their recording. Exercises are designed to adapt delivery of the reading aloud skills to each learner, ensuring that each learner develops the critical cognitive and reading skills they need to become proficient readers. The authors chose the Reading Assistant platform as it is an existing platform that the English department has been utilising to help improve students' Reading Aloud.

Reading Aloud is a component of the Primary English curriculum. This reading component makes up 5% of the English Language Paper in the Primary School Leaving Examination. This study compared the effect of computer-based immediate feedback sessions and teacher-guided sessions for reading, through a comparison of sets of data: quantitative pre-test and post-test scores and qualitative interviews with students. This report concludes by discussing the pedagogical implications of this study for developing ICT-embedded Reading Aloud sessions in a way that can support and maximise students' learning.

Introduction

The authors are cognizant of the pervasive use of technology among students and the use of technology to develop 21st century competencies in schools. With reference to the 2015 ICT Masterplan 4's vision of future-ready and responsible digital learners, teachers are designers of learning experiences and environments with the outcome goal of quality learning in the hands of every learner, empowered with technology. To infuse ICT effectively into the EL curriculum, the authors, who are members of the English Department, leveraged the *Reading Assistant* online software to improve the Reading Aloud of Primary 3 students.

In this study, Reading Aloud refers to the ability to read aloud with a focus on the correct number of words read, expression, phrasing, smoothness and pace. The focus is aligned to various components that are similar to those in the PSLE rubrics for reading aloud where the students have to read with expression and appropriate pitch and tone. During Reading Aloud sessions, students are expected to be able to read a short passage with appropriate expression, phrasing, smoothness and pace, after the teacher has explained the four different components to the students. However, due to the average teacher-student ratio of 1:40 in a typical Primary 3 classroom, the teacher is not normally able to give individualized feedback to every student during each lesson due to time constraints.

The *Reading Assistant* online software, on the other hand, is able to give each student individualised feedback at the end of each reading, allowing students to gain feedback at an earlier stage as well as to receive the (British English) modelled pronunciation of the word from the online software. The *Reading Assistant* is also able to provide students with additional resources to encourage them to read extensively. The main objective of this research is to gauge the effectiveness of the *Reading Assistant* online software in supporting the teacher-guided Reading Aloud sessions, as well as to design better learning experiences for students in English lessons.

Literature Review

There have been numerous researchers who have probed leveraging technology to teach reading. According to Klein, Nir-Gal, and Darom (2000), computers can help teachers diagnose reading difficulties, individualize instruction, engage children's attention with dynamic activities, increase implementation fidelity (including through the use of embedded multimedia support for teachers and students), provide instant and consistent feedback, track children's progress to a certain extent, and provide ongoing reports for tutors and teachers. By using two modes of teaching, i.e. teacher-guided and self-directed via the computer, students will have more than one way to achieve literacy fluency. Students will also be more engaged in learning as they receive immediate feedback and do not have to wait while the teacher tends to other students. The use of technology also encourages self-directed learning, giving the students the ownership and responsibility of charting their own learning.

The effectiveness of computer-assisted instruction has also been said to improve the reading abilities of learners and help them attain higher proficiency levels (Sivin-Kachala & Bialo, 2000). Sivin-Kachala and Bialo (2000) also summarized educational technology research, compiling information based on 311 research reviews and reports. Within the reviewed reports, primary students using computer-assisted instruction in reading made more academic improvements than students who did not use technology to enhance reading. By incorporating technology tools, students receive immediate feedback from computer software programs and they are able to learn at their own pace based on their own academic ability. Computer software is also effective as it allows students to discover various ways to learn while instructionally matching learning and teaching goals appropriate for multi-age learners (James, 2014). When learning goals are appropriate, the student can better achieve their own success criteria as there are clear learner objectives and better alignment of learning goals and learner outcomes.

Methodology

Sample

Eighty Primary 3 students in a local school in Singapore took part in this research. These students belong to two classes. Class A is made up of low progress to middle progress students whereas Class B is made up of middle progress to high progress students. In total, there are 40 girls and 40 boys.

They were randomly put into the control and intervention groups according to odd and even class register numbers. Those in the control group received standard reading practice with their English Language teacher while the intervention group used *Reading Assistant* in the computer lab with another teacher (who does not teach the class).

Intervention - Using *Reading Assistant* online software to improve Reading Aloud

Prior to our study, our school had been using the *Reading Assistant* software as a tool to improve students' reading aloud for the Reading component in the English oral examination. However, we did not have concrete evidence as to whether the use of the *Reading Assistant* software improved students' scores for the Reading component as well as whether the *Reading Assistant* software offered intrinsic motivation for the students to do better in the Reading component for their oral examinations.

How can the Reading Assistant software improve students' Reading Aloud? What other benefits does the Reading Assistant software offer to students?

The intervention lessons were carried out as an extension of the Reading Aloud lessons in class. The intervention group worked on a series of reading passages in the *Reading Assistant* online software as individuals in the computer lab. The teacher who was in charge of the intervention group only monitored the students' progress and assisted with technical issues. The materials used for the lessons were pegged to the reading ability of the individual student after each student had attempted the first assignment (Reading Progress Indicator) in the *Reading Assistant* online software. The first assignment was a series of questions which tested the students' phonetic recognition and comprehension of sentences or short passages. The 'books' listed in the computer for each student did not follow any specific themes but there was a mixture of both fiction and nonfiction books. The outline of the half hour intervention lessons was as follows:

- Lesson 1 Introduction to *Reading Assistant* online software. Students logged in to the *Reading Assistant* with their unique userid and password. They chose the first assignment – Reading Progress Indicator. Students then explored how to use the online platform via video demonstrations.
- Lessons 2 - 8 *Reading Assistant* listed titles of books that were pitched at the student's level after the completion of the first assignment. The students worked independently and they were expected to progress along three stages: Preview and Read on my own, Read and Record and Take the Quiz. The teacher in the lab provided technical support only. The students could only move to the next book title after completing all stages of the current title. They progressed to the next level of books once they had completed all the titles within their current level.

Data collection

At the start of the study, all students underwent a pre-test. All students had to read the same passage in front of a teacher individually. Each student was given one minute to read the passage. At the end of one minute, the teacher recorded the number of words correctly read by the student. This is a measure of accuracy. The teacher also used the Fluency Rubric derived from Rasinski (2004) to assess the student's fluency. (See Table 1 below.) The students were rated 1 to 4 based on expression and volume, phrasing, smoothness and pace. These rubrics were used because they were similar to the PSLE rubrics for reading aloud where the students had to read with expression and appropriate pitch

and tone. They were also expected to read with appropriate pauses. At the same time, the teacher took into account that the students were not given time for preparation and hence acknowledged that students might have some breaks in their reading and might self-correct especially with difficult words or sentence structures.

Table 1

Multi-Dimensional Fluency Rubric by Rasinski (2004)

	1	2	3	4
Expression and Volume	Reads in a quiet voice as if to get words out. The reading does not sound natural like talking to a friend.	Reads in a quiet voice. The reading sounds natural in part of the text, but the reader does not always sound like they are talking to a friend.	Reads with volume and expression. However, sometimes the reader slips into expressionless reading and does not sound like they are talking to a friend.	Reads with varied volume and expression. The reader sounds like they are talking to a friend with their voice matching the interpretation of the passage.
Phrasing	Reads word-by-word in a monotone voice.	Reads in two or three word phrases, not adhering to punctuation, stress and intonation.	Reads with a mixture of run-ons, mid-sentence pauses for breath, and some choppiness. There is reasonable stress and intonation.	Reads with good phrasing; adhering to punctuation, stress and intonation.
Smoothness	Frequently hesitates while reading, sounds out words, and repeats words or phrases. The reader makes multiple attempts to read the same passage.	Reads with extended pauses or hesitations. The reader has many "rough spots."	Reads with occasional breaks in rhythm. The reader has difficulty with specific words and/or sentence structures.	Reads smoothly with some breaks, but self-corrects with difficult words and/or sentence structures.
Pace	Reads slowly and laboriously.	Reads moderately slowly.	Reads generally at an appropriate rate throughout reading.	Reads at an appropriate conversational pace throughout the reading.

At the end of the study, eight randomly selected students from each of the control and intervention groups answered some questions in face-to-face interviews.

Results

The number of words per minute aims to find out if students are able to read more words aloud. This number gives an indication of the fluency and accuracy with which the words are read. The students in the intervention group as well as the control group showed improvements in the number of words per minute. The mean percentage increase in the number of correct words per minute in the control group (3.86%) is higher than in the intervention group (1.91%). (See Figure 1.)

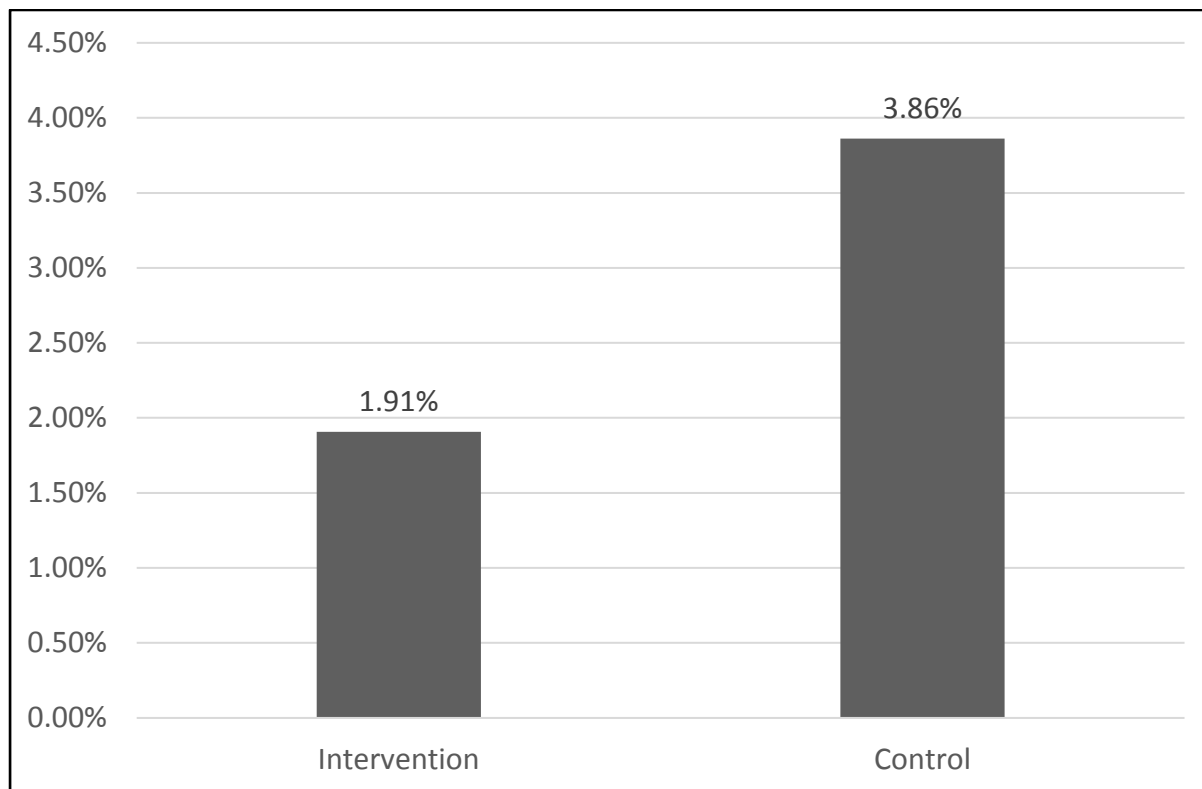


Figure 1. Mean percentage increase for words correct in one minute

The fluency rubrics were used to measure improvements made in fluency. The students in both the intervention group and control group showed improvements in the four components; expression, phrasing, smoothness and pace. (See Figure 2.)

Even though there is a percentage increase in expression and smoothness for both intervention and control groups, the percentage increase for the intervention group is much higher. The highest difference is made in the expression component where the mean percentage increase for the intervention group was 5.4% more than the control group. This is followed by smoothness where the intervention group had a mean percentage increase of 5.2% more than the control group. The mean percentage increase for the experimental group was also more than the mean percentage increase for the control group by 1.83% and 2.26% for phrasing and pace respectively.

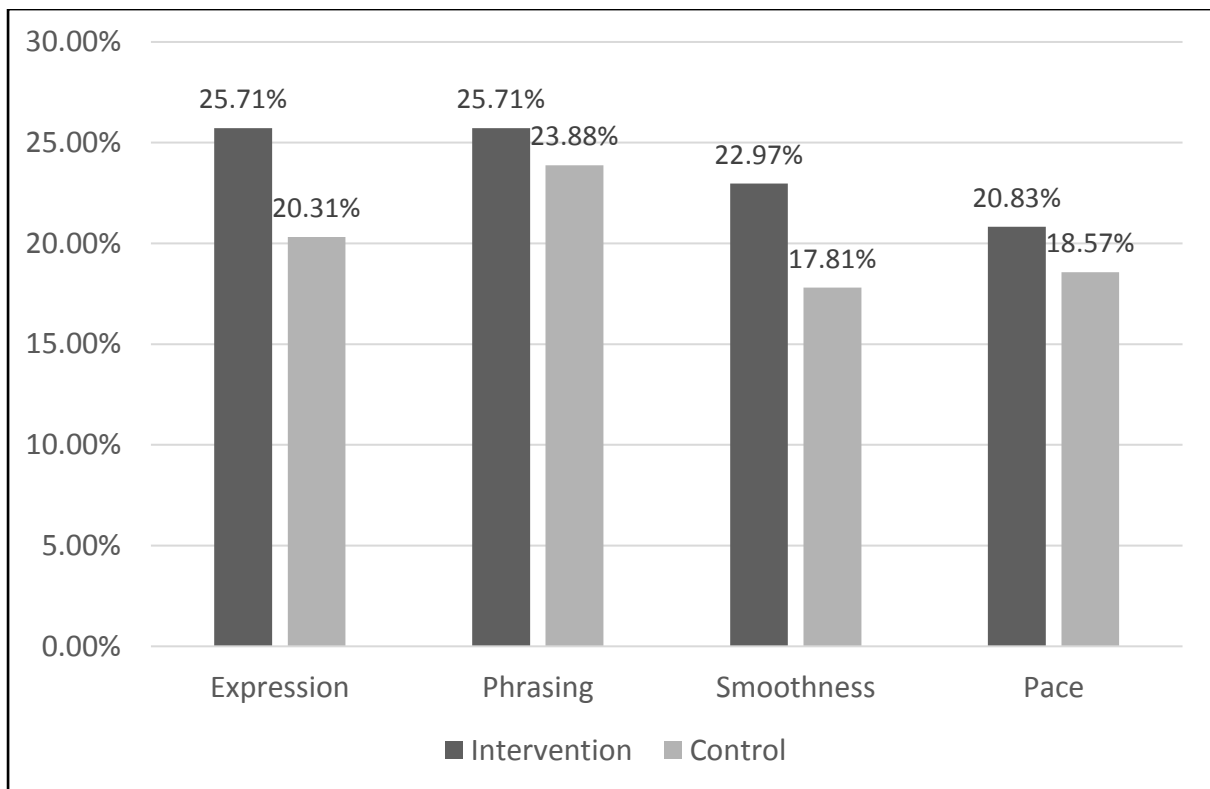


Figure 2. Percentage increases in mean fluency rubric components

Eight students from the intervention group and eight students from the control group were interviewed to find out the students' perceptions of both the teacher-guided Reading Aloud sessions and the *Reading Assistant* online software.

Those in the intervention group articulated the excitement of using ICT for reading lessons and liked the idea of self-directed learning at their own pace. One student said:

I enjoy going to the computer lab as I can control my own learning.

When using the *Reading Assistant* software, the students liked the immediate feedback that the *Reading Assistant* gave at the end of their recording. They also liked that they received scores at the end of their recording and this motivated them to improve for subsequent recordings. These comments are typical of what we heard:

I enjoy using the Reading Assistant as when we read the passages, the computer tells us which words we read correctly and wrongly.

I get points for my achievement in reading and I want to do better for the next one.

However, the students also agreed that a teacher could better help them improve their reading as a follow-up to using the *Reading Assistant*. The *Reading Assistant* did not focus on the student's tone and pitch and did not correct the students if they did not pause at the appropriate punctuation points. The students added that a teacher would be able to do what the *Reading Assistant* software did not. Students were also unsure as to how their scores were derived at the end of their recording. Below are samples of the students' comments:

The teacher will teach how to stop at appropriate points and will tell us to change our voice when there is dialogue.

No I don't know how the computer calculate my score. I only know the words that I've pronounced wrongly.

Those from the teacher-guided group articulated on the thinking and learning of reading in the classroom. One student said:

In class, I learnt about the use of question marks, commas, expression for reading, when to increase or decrease the volume and about low and high pitch.

Discussion

Based on the post-test results, the students in the intervention group were able to improve their own reading in terms of expression, phrasing, smoothness and pace through modelling their reading on the passages in the *Reading Assistant* online software.

As a whole, the mean percentage increase in the fluency rubric components was higher for the intervention group even though there was no explicit teaching of how to read fluently.

The authors agree that the *Reading Assistant* is a good reading model for students to follow as it is able to provide feedback at the end of each recorded passage through a score based on the number of words correctly pronounced. It also provided a variety of texts for the students to read and enjoy. In addition, the *Reading Assistant* online software has impacted the students in other ways such as improved motivation and interest as mentioned in the interviews.

However, some limitations of the online software are that there is no follow-up on the students' corrected pronunciation after the computer has pronounced it correctly for the student. The ICT platform may also not be sustainable and cost effective in the long run as there is no structured approach for the integration of the *Reading Assistant* platform into the Reading Aloud or Oral revision lessons and there is a lack of funds to sustain the purchase of the *Reading Assistant* site license.

This study suggests that with lower progress students or even middle progress students, there is a need for the teachers to scaffold and bring attention to learning points in addition to using the *Reading Assistant* online software. It was mentioned by one of the students during the interview that the teacher's input would further benefit them. Thus, there may be a need to build resources for teachers to supplement the use of the *Reading Assistant* online software.

Conclusion

The authors presented the findings of this research during the breakout sessions at the *Redesigning Pedagogy Conference* on 2 June 2017. The feedback given by the participants was that the *Reading Assistant* is a useful ICT platform that can assist the students in self-directed learning. However, they also agreed that the human factor was important.

Given the reality that most schools are not able to provide one-to-one tutoring for all of their struggling readers, it would be very beneficial to create approaches that are able to extend the effective principles of individual tutoring to small-group tutoring.

Human tutors supplemented by computer software designed for this purpose may offer such a solution. As educators, we must also be critical of any software that we leverage for our students' learning and ensure that the different needs of the students are met. There may be a need for us as educators to supplement with other resources where necessary.

Whilst it might be useful to do a full-scale follow-up study to measure the effectiveness of the *Reading Assistant* online software that takes into consideration the improvements for students of different abilities as well as the other impacts of using the software, the reading component only makes up 5% of the English Language Paper in the Primary School Leaving Examination. The other oral component, Stimulus-Based Conversation, makes up 10% of the English Language Paper and thus has a higher weightage in the Primary School Leaving Examination. The students also find difficulty in expressing their responses for this component. Hence, this might be an area of study that will bring about a greater benefit.

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